

# THE SEMICONDUCTOR DATA LIBRARY



*MOTOROLA Semiconductor Products Inc.*

THIRD EDITION

## REFERENCE VOLUME

MASTER INDEX  
MASTER SELECTION GUIDES  
OUTLINE DRAWINGS  
HARDWARE AND PACKAGING  
APPLICATION NOTE INDEX



**CYBERTRONICS**

INCORPORATED

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#200

English  
French  
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## APPLICATION INFORMATION

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## DIGITAL/ANALOG INTEGRATED CIRCUITS SELECTION GUIDES

Tables giving the major specifications of a wide range of integrated circuits with digital circuits listed by logic family, and linear circuits listed by function. (Other values available, are included on these tables). Complete data on integrated circuits available on request.

## SELECTION GUIDES

Grouping of packaged semiconductor by major device category (i.e., transistor, diode, thyristor, integrated circuit, semiconductor chips, etc.) for quick and selection of devices best suited for specific applications.

## DEVICES FOR MILITARY APPLICATIONS

Numbered Index of TM 59... Devices and integrated circuits that comply with military specifications.

## NON-REGISTERED DEVICE INDEX

Complete alphabetical index of all in-house non-registered device types with major electrical specifications.

## 3N... & 4N... INDEX

Complete numerical index of all G1A-registered device types with major electrical specifications.

## IN... INDEX

Ordering policy for Zenith. Complete numerical index of all G1A-registered device types with major electrical specifications.

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# THE SEMICONDUCTOR DATA LIBRARY

One of the major problems facing workers in the electronics field is the identification and selection of semiconductor devices. Type numbers assigned to the semiconductors are of little value since they indicate neither device parameters nor applications. Because it is difficult even to identify the many thousands of device type numbers, let alone evaluate their merits for a particular application, engineers often limit their designs to a few well-known device types — despite the fact that newer or more suitable devices may be available. To help alleviate this problem, the Motorola Semiconductor Data Library has been developed.

The Motorola Semiconductor Data Library identifies and characterizes all semiconductor devices with 1N---, 2N---, 3N---, and 4N--- numbers registered with the Electronics Industries Association at the time the library was printed, as well as a broad line of devices with special in-house type numbers. (It provides complete data sheet specifications for a wide range of discrete semiconductors, and short-form specifications for integrated circuits.) And in addition, to simplify the selection of the most useful semiconductor type numbers, it contains carefully prepared selector guides with recommended devices for specific applications. Properly used, it can be a valuable aid for the design engineer, the component engineer, and the purchasing agent in narrowing the broad categories of potentially usable components to those best suited for a specific project.

## COMPOSITION OF THE LIBRARY

The Semiconductor Data Library is divided into three volumes, organized as follows:

### REFERENCE VOLUME

The reference volume is a self-contained compendium of semiconductor devices and integrated circuits information. This volume enables the user to locate and select devices for most any application or specific circuit. It also contains package and hardware information as well as applications information. Once a preliminary selection of a potentially suitable device has been made, consult Volumes I or II for detailed specifications for that particular device.

**EIA Registered Device Index** — Complete numerical index of all EIA registered device types, with major electrical specifications.

**Non-Registered Device Index** — Complete numerical index of all in-house non-registered Motorola device types, with major electrical specifications.

**Master Selection Guides** — Grouping of preferred devices by major device categories for quick pre-selection of devices best suited for specific applications. Includes semiconductor devices and ICs.

**Military Device Listing** — A complete list of Motorola devices that comply with Military Specifications.

**Hardware and Packaging Information** — Device mounting hardware, heat sinks and special device packaging.

**Dimensioned Device Outlines** — Dimensioned drawings of package outlines with JEDEC and Motorola cross reference. (Includes leadform drawings on specific packages.)

**Application Note Catalog** — Selection guide listing application note by application category. Also a brief summary of the available application note contents and how to order application notes.

To meet the requirements of a practical up-to-date reference, the Reference Volume of the Semiconductor Library will be completely updated and published twice a year, with supplementary publications quarterly.

### VOLUME I

This volume contains complete data sheets for Motorola-manufactured devices with EIA-registered type numbers up to 1N4999 and 2N4999. Data sheets are in numerical sequence according to device type number except for those data sheets that cover several devices with differing type numbers. A numerical index in front of the book permits the user to quickly locate the page number of the data sheet for any device characterized in the book.

Since most of the device type numbers in the "below 5000" category have already been utilized by existing product, it is expected that this book will require little updating in the next few years. Accordingly, this volume will be reprinted only as required by the demand, and modifications will be made only when reprinting is required.

### VOLUME II

This volume contains data sheets for all Motorola-manufactured, EIA registered devices with type numbers 1N5000 and 2N5000 and up, as well as those with 3N- - - type numbers. In addition, all active data sheets for devices with special Motorola type numbers (not registered with EIA) are included.

Because this book contains the detailed data for all the most recently developed semiconductors, it will be updated through the publication of supplements. Two supplements will be published during the life of this edition.

### How to Use The Semiconductor Data Library

The library is designed to serve several specific functions;

1. To permit quick identification (together with major specifications) of EIA registered semiconductor devices with units with special Motorola type numbers.
2. To permit quick selection of the most suitable devices for a specific circuit application.
3. To permit quick selection of the devices that best meet a given set of electrical specifications.
4. To provide complete characterization of a broad line of components, encompassing most semiconductor categories, for a detailed comparison of device types.



The following examples illustrate several ways of using this library.

**Problem:** Device Identification

**Known:** Device Type Number

**Information Needed:** Device function, applications, major specifications.

**Procedure:** Consult the Master Index of the Reference Volume and locate the type number of the device in question in the alpha-numeric listing of the master index. The information given in this index lists not only the type of device it is, but also provides the major electrical specifications for the device. In addition, it indicates whether or not the device is manufactured by Motorola and, if not, whether Motorola can supply an electrically suitable equivalent. Complete data for Motorola manufactured devices can then be obtained, if required, from the other two volumes of your Semiconductor Data Library.

**Problem:** Device Preselection

**Known:** a) Intended circuit application for a particular device

b) Approximate electrical specifications of a desired device.

**Information Needed:** a) What devices are available for a specific circuit function?

b) What device types will best match a required set of electrical characteristics?

**Procedure:** Consult the Master Selection Guide section of the Reference Volume. This section contains product categories, i.e., power transistors, zener diodes, etc., and by specific market segments, including communications, consumer and military. An index to the individual selector guides is given at the beginning of the section for quick access to the pertinent guides. Complete data for Motorola manufactured devices can then be obtained, if required, from the other two volumes of your Semiconductor Data Library.

## CATALOGUE DE SEMICONDUCTEURS

Identifier et ensuite choisir les dispositifs semiconducteurs constituent l'un des grands problèmes que rencontrent ceux qui travaillent dans le domaine de l'électronique. Les différents dispositifs sont désignés par des chiffres ne donnant aucune indication sur leurs paramètres et sur leurs applications. La difficulté pour les techniciens et ingénieurs d'identifier plusieurs milliers de dispositifs les amènent à utiliser, lors de la conception de circuits, des dispositifs bien connus alors que d'autres dispositifs mieux adaptés sont disponibles. Afin de pallier cet inconvénient, Motorola a donc institué ce catalogue de semiconducteurs.

Le Catalogue de Semiconducteurs de Motorola identifie et caractérise les dispositifs semiconducteurs enregistrés auprès de l'Association des Industries Electroniques (EIA) par les symboles 1N--, 2N--, 3N-- et 4N-- ainsi que les dispositifs propres à Motorola avec des numéros spéciaux. (Ce catalogue contient les spécifications complètes pour tous les semiconducteurs discrets, et des spécifications abrégées pour les circuits intégrés.) De plus, afin de simplifier le choix des dispositifs les plus utiles, il contient également un "guide" mettant en évidence les dispositifs destinés à des applications bien spécifiques. Son utilisation adéquate peut donc être un outil de travail très utile pour l'ingénieur de circuit, l'ingénieur de composants, et l'acheteur en leur permettant de limiter le nombre de composants possible convenant le mieux pour un projet bien déterminé.

## INDEX DU CATALOGUE

Le Catalogue de Semiconducteurs comprend trois volumes:

### VOLUME DE REFERENCE

Le volume de référence résume les renseignements sur les dispositifs semiconducteurs et circuits intégrés. Ce volume permet donc à l'utilisateur de déterminer et de choisir les dispositifs pour la majorité des applications; il contient également des renseignements sur les boîtiers et sur les systèmes de montage. Une fois le choix du dispositif effectué, il suffit de consulter les Volumes I et II pour obtenir toutes les données concernant ce dispositif.

### Index des Dispositifs Homologués par EIA

Cet index fournit également les données électriques principales.

### Index des Dispositifs Non-Homologués

Cet index fournit une liste complète des dispositifs Motorola non-homologués, avec leurs données électriques principales.



## Guide

Les dispositifs les plus utilisés y sont groupés par catégories principales pour un choix rapide des composants les mieux adaptés à certaines applications (y compris dispositifs discrets et circuits intégrés.)

### Liste des Dispositifs Militaires

Cette liste fournit tous les dispositifs Motorola homologués par les Spécifications Militaires.

### Boîtiers et Modes de Montage

Fournit les modes de montage, les radiateurs et les boîtiers spéciaux.

### Dimension des Boîtiers

Dessin et dimension des boîtiers homologués par JEDEC et Motorola (y compris les dessins pour former les tiges.)

### Catalogue de Notes d'Applications

Fournit une liste complète des notes d'applications groupées par catégories, également un résumé des notes d'applications disponibles et la marche à suivre pour les obtenir.

Il est évident qu'afin de garder ce catalogue à jour, le Volume de Référence sera complètement révisé et publié deux fois par an, avec des additions supplémentaires publiées tous les trimestres.

## VOLUME I

Ce volume est constitué par les spécifications pour les composants faits par Motorola avec les numéros homologués par EIA jusqu'à 1N4999 et 2N4999. Ces spécifications sont classées par ordre numérique sauf les spécifications qui se rapportent à plusieurs types de dispositifs. Un index numérique en première page permet à l'utilisateur de déterminer rapidement le numéro de la page pour chaque dispositif décrit dans ce catalogue.

Il est probable que les dispositifs portant un numéro en-dessous de 5000 nécessiteront peu de mise à jour puisque tous ces numéros sont déjà utilisés. En conséquence, ce volume ne sera réimprimé que sur demande et les modifications apparaîtront uniquement lors de cette nouvelle édition.

## VOLUME II

Ce volume est constitué par toutes les spécifications pour les dispositifs faits par Motorola, homologués par EIA avec numéros 1N5000, 2N5000, etc., ainsi que ceux avec les numéros 3N---. De plus, les spécifications de dispositifs avec numéros spéciaux de Motorola (non homologués par EIA) y sont incluses.

Ce catalogue sera mis à jour à l'aide d'éditions

supplémentaires, car il contient toutes les données détaillées des dispositifs semiconducteurs les plus récents. Deux suppléments seront publiés pendant la durée de vie de cette édition.

### Méthode d'Utilisation du Catalogue de Semiconducteurs

Ce catalogue a pour but:

1. D'identifier rapidement, grâce aux spécifications principales, si le dispositif est homologué par EIA ou s'il s'agit d'un type spécial Motorola.
2. De sélectionner rapidement le dispositif le mieux adapté à un circuit.
3. De sélectionner rapidement un dispositif en fonction des spécifications électriques.
4. De fournir les données complètes de tout l'ensemble des composants Motorola — donc la majorité des dispositifs semiconducteurs — afin de pouvoir comparer tous les types de dispositifs.

Exemples de méthodes d'utilisation;

Question: Identifier le dispositif

Donnée: Type de dispositif

Renseignements Requis: Fonction du dispositif, applications et spécifications principales.

Méthode: Consulter l'Index du Volume de Référence et déterminer le numéro du dispositif en question parmi la liste numérique de l'index. Ce renseignement ainsi obtenu indique non seulement le type de dispositif mais également fournit les spécifications électriques principales de ce dispositif. De plus, le fabricant y sera précisé et le catalogue indiquera si Motorola peut fournir les dispositifs équivalents. Les deux autres volumes de ce catalogue vont maintenant fournir toutes les données sur les dispositifs faits par Motorola.

Question: Choix du Dispositif

Données:

- a) Application probable du circuit pour un dispositif connu.
- b) Spécifications électriques approximatives du dispositif en question.

Renseignements Requis:

- a) Quels sont les dispositifs disponibles pour la fonction précise de ce circuit?
- b) Quel type de dispositif va répondre à des caractéristiques électriques prédéterminées?

Méthode: Consulter le Guide dans le Volume de Référence qui est catégorisé par produits, c'est-à-dire transistors de puissance, diodes zener, etc., et par marchés, y compris communications, grand public, et militaire. Ces différentes catégories apparaissent en première page pour faciliter la sélection du Guide. Nous pouvons maintenant obtenir toutes les données sur les dispositifs faits par Motorola en utilisant les deux autres volumes du Catalogue de Semiconducteurs.



# DIE HALBLEITER DATENBIBLIOTHEK

Eines der Hauptprobleme für Fachleute in der Elektronik-Industrie besteht in der Bestimmung und Selektion von Halbleitertypen. Die meisten Typenbezeichnungen geben wenig oder keine Auskunft über Parameter oder Anwendungen von speziellen Halbleitern. Viele tausend verschiedene Halbleitertypen sind heute erhältlich. Es ist fast unmöglich, auch nur einen geringen Prozentsatz aller Typen genau zu kennen. Somit bringen die meisten Ingenieure und Techniker nur die bekanntesten und gebräuchlichsten Halbleitertypen zur Anwendung, auch wenn neuere und bessere Elemente zur Verfügung stehen.

Um diesem Problem Abhilfe zu schaffen hat Motorola die meisten Halbleitertypen in eine Halbleitersammlung zusammengefasst. Diese Halbleitersammlung umfasst alle 1N, 2N, 3N und 4N Typen, die durch die "Electronics Industries Association" registriert sind. Weiterhin sind eine grosse Anzahl von Motorola In-Haus Typen in dieser Sammlung zusammengefasst. Vollständige Spezifikationen einer grossen Anzahl von diskreten Halbleitern und Kuzspezifikationen von integrierten Schaltkreisen sind vorhanden.

Zusätzlich sind, zur Vereinfachung der Aufsuche der meist gebrauchten Halbleitertypennummern, Nachschlagetabellen mit Vorzugstypen für bestimmte Anwendungen in der Sammlung enthalten.

Die Halbleitersammlung kann dem Entwicklungs- und Komponent-Ingenieur sowie dem Einkäufer von Halbleitern gute Dienste leisten im Aufsuchen der best möglichen Elemente für eine bestimmte Anwendung.

## ZUSAMMENSETZUNG DER HALBLEITERSAMMLUNG

Die Halbleitersammlung besteht aus drei Teilen, die folgendermassen zusammengefasst sind:

### REFERENZ-BAND

Der Referenz-Band besteht aus einer übersichtlichen Zusammenfassung von Halbleitern und integrierten Schaltungen. Mit Hilfe dieses Referenzbandes lassen sich Halbleiter und integrierte Schaltungen für spezielle Anwendungszwecke leicht auffinden. Gehäuse-, Anwendungs- und Montagezubehörinformation sind ebenso im Referenzband angegeben. Nach der Wahl eines Halbleiters oder einer integrierten Schaltung aus dem Referenzband kann Band I oder Band II für die speziellen Daten zur Hilfe gezogen werden.

### EIA Registriertes Halbleiter-Verzeichnis

Vollständiges numerisches Verzeichnis aller EIA registrierter Halbleiter Typen, mit den hauptsächlich elektrischen Spezifikationen.

### Nicht Registriertes Halbleiter-Verzeichnis

Vollständiges numerisches Verzeichnis aller nicht registrierter In-Haus Motorola Halbleiter Typen, mit den hauptsächlich elektrischen Spezifikationen.

### Hauptnachschlagewerk

Zusammenfassung in Gruppen der bevorzugten Hauptelementkategorien für schnelle Vorselektion der Elemente die am besten für gegebene Anwendungen in Frage kommen. Dieses Dokument enthält Halbleiterelemente und integrierte Kreise.

### Militärelementen-Liste

Dies ist eine vollständige Liste von Motorola Bausteinen die Militärspezifikationen erfüllen.

### Montagezubehör und Einkapselung Information

Bauelement-Montagezubehör, Kühlelemente und Spezial-Elementeneinkapselung.

### Vermasste Elementen-Grundrisse

Vermasste Zeichnungen von Gehäusegrundrissen mit JEDEC und Motorola Gegenüberstellung. (Zeichnungen der Anschlussformen von gegebenen Gehäusen sind inbegriffen.)

### Anwendungsbericht-Katalog

Nachschlagliste der Anwendungsberichte welche in Anwendungskategorien zusammengefasst sind. Eine kurze Zusammenfassung des Inhalts der verfügbaren Berichte ist gegeben und ebenfalls wie sie bestellt werden können.

Um den Anforderungen eines praktischen, auf den letzten Stand gebrachten Nachschlagewerkes zu genügen wird der Referenz-Band der Halbleiterbibliothek zweimal im Jahr vollständig überarbeitet und publiziert. Zusätzliche Veröffentlichungen werden vierteljährlich herausgegeben.

## BAND I

Dieser Band enthält vollständige Datenblätter der von Motorola fabrizierten Elemente mit EIA registrierten Nummern bis zu 1N4999 und 2N4999. Die Datenblätter sind in numerischer Ordnung gemäss der Bauelemente-Typennummer eingereiht. Ausnahme sind solche Datenblätter welche spezielle Elemente mit wechselnden Typennummern behandeln. Ein numerisches Verzeichnis am anfang des Bandes erlaubt dem Benutzer ein schnelles Auffinden der Datenblätter für alle Elemente, die im Buch aufgeführt sind.

Weil die meisten Elemente-Typennummern in der Kategorie bis 5000 schon von bestehenden Produkten aufgebraucht wurden, ist erwartet, dass dieser Band in den nächsten Jahren wenig Ueberarbeitung verlangt. Dementsprechend wird dieses Buch nur neu gedruckt wenn die Nachfrage es verlangt und Modifikationen werden nur bei einer Neuauflage vorgenommen.

## BAND II

Dieser Band enthält Datenblätter der von Motorola hergestellten EIA registrierten Elemente mit der Typennummer 1N5000 und 2N5000 und aufwärts und ebenfalls solche mit den 3N- - Typennummern. Alle aktiven Datenblätter für Elemente mit speziellen Motorola Typennummern (nicht EIA registriert) sind zusätzlich



hier einbezogen.

Weil dieser Band die detaillierten Daten für alle der erst kürzlich entwickelten Halbleiter enthält, wird er durch Publikationen von Zusatzbüchern auf den letzten Stand gebracht. Zwei Zusatzbücher werden während der "Lebensdauer" dieser Ausgabe veröffentlicht werden.

#### Wie wird "Die Halbleiter Datenbibliothek" gebraucht

Die Bibliothek ist zusammengestellt worden um mehrere spezielle Funktionen zu erfüllen:

1. Erlaubt schnelle Bestimmung (zusammen mit Hauptspezifikationen) von EIA registrierten Halbleitern und Bausteinen mit speziellen Motorola Typennummern.
2. Erlaubt schnelle Selektion der best geeigneten Elemente für eine bestimmte Schaltungsanwendung.
3. Erlaubt schnelle Selektion von Elementen welche am besten gegebene elektrische Spezifikationen erfüllen.
4. Liefert vollständige Charakterisation einer breiten Komponentenlinie, welche die meisten Halbleiter-Kategorien einschliesst. Erlaubt einen detaillierten Vergleich der Elementtypen.

Die nachfolgenden Beispiele veranschaulichen mehrere Wege um diese Bibliothek zu gebrauchen.

Problem: Elementen-Bestimmung

Bekannt: Elemente-Typennummer

Benötigte Information: Elementefunktion,  
Anwendung, Haupt-  
spezifikationen

Vorgang: Im Hauptverzeichnis des Referenzbandes sind die Typennummern des zu untersuchenden Elementes in der alphanumerischen Liste aufgeführt. Die

Information, die in diesem Verzeichnis gegeben ist, besteht nicht nur aus dem Elemententyp sondern auch die elektrischen Hauptspezifikationen sind gegeben. Zusätzlich ist angegeben ob das Element von Motorola hergestellt wird und, im Fall dass dies verneint wird, ob Motorola ein elektrisch vergleichbares Bauelement liefern kann. Wenn benötigt, können die vollständigen Daten der von Motorola hergestellten Halbleiter von den zwei anderen Bänden der Halbleiter Bibliothek erhalten werden.

Problem: Elementen-Vorbestimmung  
Bekannt:

- a) Vorgesehene Schaltkreisanwendung für ein bestimmtes Element.
- b) Ungefähre elektrische Spezifikationen eines gewünschten Typs.

Benötigte Information:

- a) Welche Elemente sind für eine bestimmte Kreisfunktion verfügbar?
- b) Welche Elementtypen erfüllen am besten die erforderlichen elektrischen Charakteristiken?

Vorgang: Das Hauptnachschlagwerk des Referenzbandes wird aufgeschlagen. Dieses Kapitel enthält Produktkategorien, z.B. Leistungstransistoren, Zenerdioden etc. eingereiht in bestimmte Marktsegmente, einschliesslich Fernmeldewesen, Verbraucherindustrie und Militärbereich. Ein "Index" zu den einzelnen "Auswahl-Führern" ist am anfang dieses Kapitels gegeben, was zum schnellen Auffinden der zutreffenden "Führer" hilft. Vollständige Daten der von Motorola hergestellten Elemente können, wenn benötigt, von den zwei anderen Bänden entnommen werden.



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## (半導体データ ライブラリー)

電子工業にたずさわっているものが直面する難問の1つは、半導体製品の分類と選択である。個々の製品の型番号はその製品のパラメータや用途を直接示すものではないので大して役には立たない。

特定の用途に対して製品のメリットを検討することなどは言うにおよばず、数万にのぼる型番号を分類することも非常に困難なことである。したがって新製品やより適切な製品があるにも拘らず、技術者が設計にあたって採用するのは少数のよく知られている製品に限られてしまうことがよくある。このライブラリは、このような問題を解決するために編集されたものである。

このライブラリはEIA(電子工業会)に登録された1N..., 2N..., 3N..., 4N...番号をもつすべてのディスクリート(半導体製品)と登録外のもトローラ製品を巾広く分類し、その特性を収録している。

またIC製品についても概略データが記載されている。

さらに最も適当な製品を簡単に選択できるように用途別に推薦製品をセレクト・ガイドとして紹介しているので、設計技術者、部品技術者および購買担当者は膨大な半導体製品の中から特定のプロジェクトに最も適したものだけにしぼることができる。

### ライブラリの構成

このライブラリは3巻に分れ次のように構成されている。

### REFERENCE VOLUME (リファレンス・ボリューム)

この巻は半導体製品とIC製品の完全な概略データを収録しているので、ユーザーはどんな用途や回路に使う素子でも選び出すことができる。またパッケージ、取付け部品および応用例も記載されている。この巻で適当な素子をあらかじめ選び出すと、第1巻および第2巻でそれらの詳細なデータを調べることができる。

**EIA登録製品の索引**——EIA(電子工業会)に登録された全製品の完全な番号順索引と主な電気特性。

**EIA登録外製品の索引**——モトローラ社の標準規格品の完全な番号順索引と主な電気特性。

**マスタ・セクション・ガイド** —— 半導体製品とIC製品を含め、最適な素子が簡単に選び出せるよう用途別に分類されている。

**政府用製品リスト**——政府の仕様によるモトローラ製品の完全なリスト。

**取付け部品とパッケージング**——取付け部品、ヒート・シンクおよび特別品のパッケージング。

**ケースの概略平面図**——JEDECとモトローラ製品の互換性データとケースの概略平面図(特定のパッケージのリードフォームの図を含む。)

**アプリケーション・ノート・カタログ**——用途別アプリケーション・ノートのセクション・ガイドと各ノートの要約および注文方法。

最新情報に対する要望に応えるため、この巻は年4回の増補版とともに、年2回発行され完全な最新情報を収録している。

### VOLUME I (第1巻)

第1巻はEIAに登録された1N4999および2N4999までのモトローラ製品の完全なデータを収録している。数種の製品番号をまとめて記載しているデータ・シートを除いてはすべて番号順に整理されている。巻頭の番号順索引から、第1巻中のどの製品についてもデータ記載ページが簡単に調べられる。

5000以下の型番号に対しては既にほとんど製品ができていますので、この巻は2、3年後も再版の必要はないと思われる。したがって必要がある場合にのみ再版され、修正が加えられる。

### VOLUME II (第2巻)

第2巻は1N5000と2N5000以上および3Nの型番号でEIAに登録されたモトローラ製品と、登録外のもトローラ標準規格品の全データ・シートを収録している。第2巻にはごく最近開発された半導体製品の詳細なデータまで収録され、なおかつ再版までに増補版2巻が追加されるので、つねに最新のデータが得られる。

### 半導体データ・ライブラリの使用法

このライブラリは次のように使える。

- 1) EIAに登録された半導体製品とモトローラ社の型番号をもった製品が容易に確認でき、主な特性を調べることができる。
- 2) 特定の回路応用例に対して最適の製品を迅速に選び出すことができる。
- 3) 指定された電気特性に最もよくあう製品を容易に選択できる。
- 4) 広範囲にわたる半導体製品の完全な特性を収録しているので、詳細にわたって製品の比較ができる。



具体的な使用例を紹介してみよう。

例： 製品の確認

わかっていること： 型番号

調べたいこと： 製品の機能、応用例、特性

方法： まず、リファレンス・ボリュームのマスタ・インデックスをひき、アルファベット番号順リストで、自分の製品番号を見つける。この索引では製品の型番号だけでなく、主な電気特性およびモトローラ製かどうかということも表示している。もしモトローラ製品でない場合は、電氣的に適当な同等品があるかどうか分かる。モトローラ製品の完全なデータが必要な場合は、半導体データ・ライブラリの第1巻および第2巻から調べることができる。

例：製品の予備選択

わかっていること：

a) 特定の製品に対する応用企画。

b) 必要な電気的特性。

調べたいこと：

a) 目的にあう製品にはどんなものがあるか。

b) どんなタイプの製品が最適であるか。

方法： まず、リファレンス・ボリュームのマスタ・セレクション・ガイドの章をみる。この章は通信機器用、民生機器用、政府用機器を含めて、パワ・トランジスタあるいはゼナー・ダイオード等種類別に記載されている。この章の第1ページにはセレクト・ガイドがついており使いやすい。モトローラ製品の完全なデータが必要な場合は、半導体データ・ライブラリの第1巻および第2巻から調べることができる。



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# 1N ... JEDEC REGISTERED DEVICES

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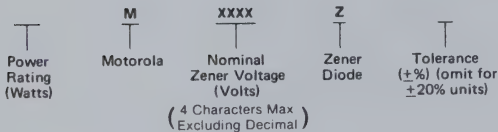
## DEVICE OPTION

This section provides ordering information for Motorola's broad line of non-standard devices with variations in voltage and tolerance. It also includes the method for specifying matched sets and zener clipper diodes.

### NON-STANDARD ZENER DIODES SPECIAL VOLTAGE AND TOLERANCE RATINGS

JEDEC "1N" type numbers denote a specific Zener voltage, power rating, and tolerance. For example, JEDEC type 1N4728 is a standard 1 watt diode, rated at 3.3 volts  $\pm 10\%$ . A suffix "A" on this type number indicates a  $\pm 5\%$  voltage tolerance.

Special Motorola devices, with a choice of voltages and tolerances are also available. The following diagram explains the Motorola coding system:



For example, the code for a special 10 watt Zener diode with a voltage of 41 volts and a tolerance of  $\pm 1\%$  would be: 10M41Z1.

Following is a list of other standard Motorola symbols for special Zener orders (X's indicate nominal Zener voltage):

BASIC MOTOROLA TYPE	DEVICE DESCRIPTION
1/4MXXXAZ5	250 mW Alloy Glass, $\pm 5\%$
1/4MXXXZ5	250 mW Glass, $\pm 5\%$
.4MXXXAZ5	400 mW Alloy Glass, $\pm 5\%$
.4MXXXZ10	400 mW Glass, $\pm 10\%$
.5MXXXZS10	500 mW Surmetic, $\pm 10\%$
1MXXXAZ10	1 Watt Flangeless, $\pm 5\%$
1MXXXZ10	1 Watt Alloy Flangeless, $\pm 10\%$
1MXXXZS5	1 Watt Flangeless, $\pm 10\%$
1.5MXXXZ	1 Watt Surmetic, $\pm 5\%$
5MXXXZ	1.5 Watt, $\pm 20\%$
5MXXXZS5	5 Watt Surmetic, $\pm 5\%$
10MXXXAZ5	10 Watt Alloy Stud, $\pm 5\%$
10MXXXZ10	10 Watt Stud, $\pm 10\%$
50MXXXAZ10	50 Watt Alloy TO-3, $\pm 10\%$
50MXXXAZS5	50 Watt Alloy Stud, $\pm 5\%$
50MXXXZ	50 Watt TO-3, $\pm 20\%$
50MXXXZS5	50 Watt Stud, $\pm 5\%$

For reverse polarities (10 W and 50W), insert "R" before tolerance, ie., 50M110SZR5.

1N5518 thru 1N5546 — This series may be ordered in  $\pm 2\%$  and  $\pm 1\%$  tolerance by adding the following suffix:

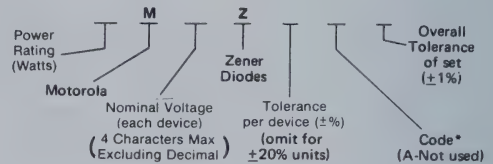
C =  $\pm 2\%$       D =  $\pm 1\%$

For example, the 1N5518D would be the same as the 1N5518B except  $V_Z = 3.3 \pm 1\%$ .

### MATCHED SETS OF ZENER DIODES

Zener diodes can also be obtained in sets consisting of two or more matched devices. The method for specifying such matched sets is similar to the one described for specifying units with a special voltage and/or tolerance except that two extra suffixes are added to the code number described above.

These units are marked with code letters to identify the matched sets and in addition, each unit in a set is marked with the same serial number which is different for each set being ordered.



#### \*Code

- B — Two devices in series
  - C — Three devices in series
  - D — Four devices in series
  - E — Five devices in series
  - F — Six devices in series
  - G — Seven devices in series
  - H — Eight devices in series
  - P — Two devices in parallel (not recommended)
  - X — Two devices; one standard polarity, the other reverse polarity. (10 and 50 watts only)
- i.e., 10M51Z5B1 is for two 10 watt zeners, each of 51 volts,  $\pm 5\%$ , matched to a total voltage of 102 volts  $\pm 1\%$ .

### ORDERING OF MATCHED SETS

Order per instructions in "Matched Sets of Zener Diodes" or else specify the following:

- Type of matched set (series or parallel)
- Number of units per set
- Device type (with proper suffix to indicate tolerance)
- Number of sets required
- Total voltage and overall tolerance of the set

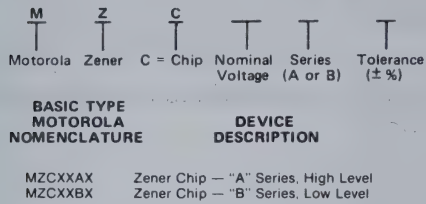
### ADDITIONAL NOTES

Consult factory for pricing and ordering information on special sets. For example: 1) Sets with overall tolerance different from those shown; 2) Matched sets of temperature compensated devices; 3) Sets which require basic device types within the set to be different from each other; 4) Sets with device type nominal voltages outside the range of the Zener family involved; 5) Tight tolerance temperature compensated diodes.



## ZENER CHIPS (MZC)

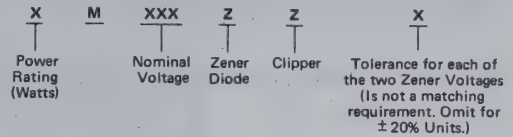
1. The nomenclature for Zener Chips is as follows:



2. Chips are sold in increments of ten (10) only
3. Chips are **not** sold as matched sets or clippers.
4. A "-1" suffix will cause all chips ordered to be supplied in Deka-Pak.

## ZENER CLIPPERS

Special clipper diodes with opposing Zener junctions built into the devices are available by using the following nomenclatures:



This nomenclature is applicable to all packages and power ratings as restricted in the above paragraphs.

### ORDERING INFORMATION

Order using the above nomenclature or else specify the device type, nominal voltage and tolerance required.



# NUMERICAL INDEX

## 1N--- TYPE NUMBERS

The following table provides a numerical index and short-form specifications for EIA-registered 1N type numbers.

### KEY

					<b>RECTIFIERS</b> $V_R$ = DC Blocking Voltage $V_F$ = Average Forward Voltage Drop $I_O$ = Average Rectifier Forward Current $I_R$ = Average Reverse Current $I_{FSM}$ = Peak Surge Current	<b>ZENER DIODES</b> $V_Z(\text{Nom})$ = Nominal Zener Breakdown Voltage (Volts) $I_{ZT}$ = Test Current for Zener Voltage (mA) $Tol$ = Tolerance for Specified Nominal Zener Breakdown Voltage $P_D$ = Maximum Power Dissipation $M$ = Milliwatts $W$ = Watts								
TYPE	MATERIAL	REPLACE- MENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES				
					$V_R$ volts	$V_F$ volts	$I_O$ (Amps)	$I_R$ mA	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	$Tol$ $V_{Z\pm\%}$	$P_D$	
					SIGNAL DIODES					REFERENCE DIODES				
					PRV Volts	$V_F @ I_F$ Volts	$I_R$	$t_{rr}$ ( $\mu s$ )		$V_Z$ (nom)	$T_C$ $^{\circ}C$	$I_{ZT}$ mA	Temp. Range	
Numerical Listing of Registered Type Numbers					SHADING INDICATES SIGNAL DIODES  $PRV$ = Peak Reverse Voltage $V_F @ I_F$ = Maximum Forward Voltage at Indicated Forward current – $M$ = Milliamp, $A$ = amp $I_R$ = Reverse Current – $M$ = milliamp, $\mu$ = microamp $N$ = nanoamp $t_{rr}$ = Reverse Recovery Time					SHADING INDICATES REFERENCE DIODES  $V_Z(\text{Nom})$ = Nominal Zener Breakdown Voltage (Volts) $T_C$ = Average Temperature Coefficient over Temperature Range $I_{ZT}$ = Test Current for Zener Voltage (mA) Temp Range = Operating Range of Average $T_C$				
S = Silicon G = Germanium GA = Gallium Arsenide SE = Selenium														
Type number of recommended replacement or of nearest electrical equivalent fully characterized in this book.														
Reference device number indicates specific Data Sheet on which device is characterized.														
The codes listed below define the listed device and indicates the appropriate specification column heading. R – Rectifiers, Fast Recovery DZ – Diode, Zener DR – Diode, Reference DS – Diode, Signal														



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ @ $I_F$	$I_F$	$I_R$	$t_{rr}$ ( $\mu s$ )	$V_Z$ (nom)	$T_C$ %/°C	$I_{ZT}$ mA	Temp Range
1N23H		Microwave Mixer - to 9000 MHz;		DS	60	1.0	8.5M	15*					
1N34	G			DS	60	1.0	5.0M	30*					
1N34A	G			DS	50			2.0M					
1N35	G			DS	100	1.0	7.5M	25*					
1N38	G			DS	100	1.0	4.0M	6.0*					
1N38A	G			DS	100	1.0	4.0M	6.0*					
1N38B	G			DS	200	1.0	5.0M	40*					
1N39	G			DS	200	1.0	5.0M	40*					
1N39A	G			DS	200	1.0	4.0M	650*					
1N39B	G			DS	25								
1N40	G			DS	25								
1N41	G			DS	50								
1N42	G			DS	60	1.0	5.0M	20*					
1N43	G			DS	115	1.0	3.0M	410*					
1N44	G			DS	75	1.0	3.0M	410*					
1N45	G			DS	50	1.0	3.0M	1.5M					
1N46	G			DS		1.0	5.0M	400*					
1N47	G			DS	85	1.0	4.0M	833*					
1N48	G			DS	50	1.0	4.0M						
1N49	G			DS	50	1.0	4.0M						
1N50	G			DS	50	1.0	2.5M						
1N51	G			DS	85	1.0	4.0M	150*					
1N52	G			DS	50	1.0	5.0M	100*					
1N52A	G			DS									
1N53	S	Microwave Ka-band Mixer: f = 34,860 MHz; NF = 13.1 to 9.0 dB											
1N53A	S	Microwave Ka-band Mixer: f = 34,860 MHz; NF = 13.1 to 9.0 dB											
1N53B	S	Microwave Ka-band Mixer: f = 34,860 MHz; NF = 13.1 to 9.0 dB											
1N53C	S	Microwave Ka-band Mixer: f = 34,860 MHz; NF = 13.1 to 9.0 dB											
1N53D	S	Microwave Ka-band Mixer: f = 34,860 MHz; NF = 13.1 to 9.0 dB											
1N54	G			DS	35	1.0	5.0M	10*					
1N54A	G			DS	50	1.0	5.0M	7.0*					
1N55	G			DS	150	1.0	3.0M	0.3M					
1N55A	G			DS	150	1.0	4.0M	500*					
1N55B	G			DS	190	1.0	5.0M	500*					
1N56	G			DS	30	1.0	15M	300*					
1N56A	G			DS	40	1.0	15M	300*					
1N57	G			DS	80	1.0	3.6M	300*					
1N58	G			DS	100	1.0	5.0M	800*					
1N58A	G			DS	100	1.0	4.0M	800*					
1N59	G			DS	250	1.0	3.0M	800*					
1N60	G			DS	50	1.0	5.0M	40*					
1N60A	G			DS	40								
1N61	G			DS	130	1.0	5.0M	300*					
1N62	G			DS	110	1.0	5.0M	700*					
1N63	G			DS	125	1.0	4.0M	50*					
1N63A	G			DS	100	1.0	4.0M	50*					
1N64	G			DS	20								
1N65	G			DS	85	1.0	2.5M	200*					
1N66	G			DS	60	1.0	5.0M	50*					
1N66A	G			DS	60	1.0	5.0M	50*					
1N67	G			DS	80	1.0	4.0M	5.0*					
1N67A	G			DS	100	1.0	4.0M	5.0*					
1N68	G			DS	100	1.0	3.0M	625*					
1N68A	G			DS	130	1.0	3.0M	625*					
1N69	G			DS	75	1.0	5.0M	50*					
1N69A	G			DS	60	1.0	5.0M	30*					
1N70	G			DS	125	1.0	3.0M	25*					
1N70A	G			DS	100	1.0	3.0M	25*					
1N71	G			DS	40	1.0	15M	0.3M					
1N73	G			DS		1.7	15M	0.05M					
1N74	G			DS		1.8	15M	0.05M					
1N75	G			DS	125	1.0	2.5M	50*					
1N76	S	Microwave X-band Detector f = 9,375 MHz; $V_O$ = 5.0 mV to 16 mV											
1N76A	S	Microwave X-band Detector f = 9,375 MHz; $V_O$ = 5.0 mV to 16 mV											
1N77A	S	Photosensitive Device; $V_F$ = 10 V @ 10 mA, $I_R$ (dark) = 30 $\mu A$ @ 50 V											
1N77B	S	Photosensitive Device; $V_F$ = 10 V @ 10 mA, $I_R$ (dark) = 30 $\mu A$ @ 50 V											
1N78	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N78A	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N78B	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N78C	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N78D	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N78E	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N78F	S	Microwave Ku-band Mixer: f = 16,000 MHz; NF = 12 to 7.5 dB											
1N79		Meter Rectifier - to 3,000 MHz											
1N81	G			DS	50	1.0	3.0M	10*					
1N81A	G			DS	40	1.0	3.0M	10*					
1N82	S	Microwave Mixer - to 1,000 MHz; NF = 16 to 14 dB											
1N82A	S	Microwave Mixer - to 1,000 MHz; NF = 16 to 14 dB											
1N82AG	S	Microwave Mixer - to 1,000 MHz; NF = 16 to 14 dB											
1N82G	S	Microwave Mixer - to 1,000 MHz; NF = 16 to 14 dB											
1N83	G			DS	225	1.0	5.0M	30*					
1N84	G			DS	12	1.0	60M	0.1M					
1N85		Photosensitive Device; $I_R$ (dark) = 20 $\mu A$ @ 90 V, Sensitivity = 0.35 $\mu A/mW$ @ 90 V											



**1N86-1N194**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub>	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N86	G			DS	70	1.0	4.0M	50*					
1N87	S			DS	23	0.25	0.1M	30*					
1N87A	S			DS	23	0.25	0.1M	10*					
1N88	S			DS	85	1.0	2.5M	0.1M					
1N89	G			DS	100	1.0	3.5M	8.0*					
1N90	G			DS	75	1.0	5.0M	800*					
1N91	G		1N91	R	100	0.5	0.15	4.0	25				
1N92	G		1N91	R	200	0.5	0.1	2.0	25				
1N93	G		1N91	R	300	0.5	0.075	1.3	25				
1N94	G			R	380	0.7	0.5	0.8	25				
1N95	G			DS	75	1.0	10M	800*					
1N96	G			DS	75	1.0	20M	800*					
1N96A	G			DS	60	1.0	40M	500*					
1N97	G			DS	100	1.0	10M	100*					
1N98	G			DS	100	1.0	20M	100*					
1N98A	G			DS	250	1.0	40M	100*					
1N99	G			DS	100	1.0	10M	50*					
1N100	G			DS	100	1.0	20M	50*					
1N100A	G			DS	80	1.0	40M	0.05M					
1N101	G			DS	150	1.0	10M	10*					
1N102	G			DS	75	1.0	15M	3.0*					
1N103	G			DS	12	1.0	30M	0.1M					
1N104	G			DS	12	1.0	30M	0.1M					
1N105	S	Microwave Switch:		BV = 500 V, P <sub>D</sub> = 8.0 W									
1N106	G			DS	300	1.0	20M	70*					
1N107	G			DS	10	1.0	150M	200*					
1N108	G			DS	50	1.0	50M	200*					
1N109	G			DS	15	1.0	1.0M	0.1M					
1N110	G	Microwave Mixer - to		1,000 MHz, NF = 10 dB									
1N111	G			DS	70	1.0	5.0M	25*					
1N112	G			DS	70	1.0	5.0M	50*					
1N113	G			DS	70	1.0	2.5M	25*					
1N114	G			DS	70	1.0	2.5M	50*					
1N115	G			DS	70	1.0	2.5M	100*					
1N116	G			DS	75	1.0	5.0M	100*					
1N117	G			DS	75	1.0	10M	100*					
1N118	G			DS	75	1.0	20M	100*					
1N118A	G			DS	60	1.0	40M	0.1M					
1N119	G			DS	60	1.0	5.0M		0.5				
1N120	G			DS	60	1.0	5.0M		0.5				
1N124	G	Microwave Mixer - to		1,000 MHz, NF = 10 to 8.0 dB									
1N124A	G	Microwave Mixer - to		1,000 MHz, NF = 10 to 8.0 dB									
1N126	G			DS	75	1.0	5.0M	50*					
1N126A	G			DS	75	1.0	25M	50*					
1N127	G			DS	125	1.0	3.0M	25*					
1N127A	G			DS	125	1.0	25M	25*					
1N128	G			DS	50	1.0	3.0M	10*					
1N128A	G			DS	40	1.0	3.0M	10*					
1N132	G			DS	25	5.0	0.5	3.0M	300*				
1N133	G			DS	5.0	0.5	3.0M	300*					
1N134	S	UHF Detector: f =		400 MHz									
1N137A	S			DS	36	1.0	3.0M	0.03*					
1N137B	S			DS	36	1.0	20M	0.03*					
1N138A	S			DS	18	1.0	5.0M	0.01*					
1N138B	S			DS	18	1.0	40M	0.01*					
1N139	G			DS	40	1.0	20M	1.5M					
1N140	G			DS	70	1.0	40M	300*					
1N141	G			DS	70	1.0	20M	50*					
1N142	G			DS	100	1.0	5.0M	100*					
1N143	G			DS	100	1.0	40M	100*					
1N144	G			DS	30	1.0	100M	200*					
1N145	G			DS	30	1.0	40M	100*					
1N147	G	UHF Mixer: f = 900 MHz;		NF = 10 to 9.0 dB									
1N147A	G	UHF Mixer: f = 900 MHz;		NF = 10 to 9.0 dB									
1N149	S	Microwave X-band Mixer:		f = 9,375 MHz; NF = 8.3 dB									
1N150	S	Microwave C-band Mixer:		f = 6,750 MHz; NF = 9.8 dB									
1N151	G			R	100	0.7	0.5	2.4	25				
1N152	G			R	200	0.7	0.5	1.9	25				
1N153	G			R	300	0.7	0.5	1.2	25				
1N155	S	Microwave Detector: f =		9,000 MHz									
1N155A	S	Microwave Detector: f =		9,000 MHz									
1N156	S	Microwave X-band Mixer:		f = 9,375 MHz									
1N158	G			R	380	1.4	0.5	0.8	25				
1N160	S	Microwave C-band Mixer:		f = 6,750 MHz; NF = 11.4 dB									
1N173A	S	UHF Mixer - to 1,000 MHz;		NF = 13 dB									
1N188	G	Photosensitive Device; I <sub>R</sub> (dark) =		20 μA @ 40 V, Sensitivity = 10 μA/mW									
1N189	G	Photosensitive Device; R <sub>p</sub> =		4,000 ohm, Sensitivity = 0.083%/fc									
1N190	G			DS	3.0	0.75	10M	0.8M					
1N191	G			DS	90	1.0	5.0M		0.5				
1N192	G			DS	70	1.0	5.0M		0.5				
1N193	G			DS	40	2.0	1.0M	40*	0.5				
1N194	S			DS	40	2.0	1.5M	10*	0.2				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N194A	S			DS	40	1.0	1.0M	10*	0.2				
1N195	S			DS	40	2.0	2.0M	10*	0.3				
1N196	S			DS	40	2.0	1.0M	10*	0.1				
1N198	G			DS	80	1.0	4.0M	10*					
1N198A	G			DS	80	1.0	4.0M	10*					
1N198B	G			DS	80	1.0	4.0M	10*	0.3				
1N200	S			DS	6.8	1.0	50M						
1N201	S			DS	8.2	1.0	35M						
1N202	S			DS	10	1.0	30M						
1N203	S			DS	12	1.0	23M						
1N204	S			DS	15	1.0	17M						
1N205	S			DS	18	1.0	12M	0.1*					
1N206	S			DS	22	1.0	9.0M	0.1*					
1N207	S			DS	27	1.0	7.0M	0.1*					
1N208	S			DS	33	1.0	5.5M	0.1*					
1N209	S			DS	39	1.0	4.5M	0.1*					
1N210	S			DS	47	1.0	3.5M	0.1*					
1N211	S			DS	56	1.0	2.7M	1.0*					
1N212	S			DS	68	1.0	2.0M	1.0*					
1N213	S			DS	82	1.0	1.5M	1.0*					
1N214	S			DS	100	1.0	1.2M	1.0*					
1N215	S			DS	120	1.0	0.9M	1.0*					
1N216	S			DS	150	1.0	0.7M	5.0*					
1N217	S			DS	180	4.0	6.5M	5.0*					
1N218	S			DS	220	4.0	6.0M	5.0*					
1N219	S			DS	270	4.0	3.0M	5.0*					
1N220	S			DS	330	4.0	2.2M	5.0*					
1N221	S			DS	390	4.0	2.0M	5.0*					
1N222	S			DS	470	4.0	1.5M	5.0*					
1N225	S	.5M8.7ZZS10	†	DZ						10	0.2		150M
1N225A	S	.5M9.1ZZS5	†	DZ						9.1	0.2	5.0	150M
1N226	S	.5M10.5ZZS10	†	DZ						12	0.2		150M
1N226A	S	.5M10ZZS5	†	DZ						10	0.2	5.0	150M
1N227	S	.5M12.7ZZS10	†	DZ						14.5	0.2		150M
1N227A	S	.5M12ZZS5	†	DZ							0.2	5.0	150M
1N228	S	.5M15.7ZZS10	†	DZ						18	0.2		150M
1N228A	S	.5M15ZZS5	†	DZ							0.2	5.0	150M
1N229	S	.5M19ZZS10	†	DZ						21	0.2		150M
1N229A	S	.5M18ZZS5	†	DZ							0.2	5.0	150M
1N230	S	.5M23.5ZZS5	†	DZ						27	0.2		150M
1N231	S	.5M28.5ZZS10	†	DZ						32	0.2		150M
1N232	S	.5M34.5ZZS10	†	DZ						39	0.2		150M
1N233	S	.5M41ZZS10	†	DZ						45	0.2		150M
1N234	S	.5M48.5ZZS10	†	DZ						54	0.2		150M
1N235	S	.5M58ZZS10	†	DZ						64	0.2		150M
1N236	S	.5M71ZZS10	†	DZ						80	0.2		150M
1N237	S	.5M87.5ZZS10	†	DZ						100	0.2		150M
1N238	S	.5M105ZZS10	†	DZ						120	0.2		150M
1N239	S	.5M127.5ZZS5	†	DZ						145	0.2		150M
1N248	S	1N248A		R	50	1.5	10	5.0	200				
1N248A	S	1N248B	1N248B	R	50	1.5	20	5.0	250				
1N248B	S		1N248B	R	50	1.5	20	5.0	250				
1N248C	S		1N248B	R	39	1.2	20	3.8	350				
1N249	S	1N249A	1N249B	R	100	1.5	10	5.0	200				
1N249A	S	1N249B	1N248B	R	100	1.5	20	5.0	250				
1N249B	S		1N248B	R	100	1.5	20	5.0	250				
1N249C	S		1N248B	R	77	1.2	20	3.6	350				
1N250	S	1N250A		R	200	1.5	10	5.0	200				
1N250A	S	1N250B	1N248B	R	200	1.5	20	5.0	250				
1N250B	S		1N248B	R	200	1.5	20	5.0	250				
1N250C	S		1N248B	R	154	1.2	20	3.4	350				
1N251	S			DS	30	1.0	5.0M	0.1*	0.15				
1N252	S			DS	20	1.0	10M	0.1*	0.15				
1N253	S	MR1121	MR1120	R	95	1.5	1.0	0.1	4.0				
1N254	S	MR1122	MR1120	R	190	1.5	0.4		1.5				
1N255	S	MR1124	MR1120	R	380	1.5	0.4		1.5				
1N256	S	MR1126	MR1120	R	570	1.5	0.2		1.0				
1N259	S	Microwave Mixer pair - to 9,000 MHz											
1N263	G	Microwave X-band Mixer: f = 9,375 MHz; NF = 7.5 dB											
1N264	G	Microwave Mixer pair: f = 3,000 MHz											
1N265	G			DS	90	1.0	3.2M	100*					
1N266	G			DS	60	1.0	4.0M	75*					
1N267	G			DS	25	1.0	3.5M	12*					
1N268	G			DS	30	1.0	2.5M	20*					
1N269	G	Microwave S-band Mixer: NF = 7.5 dB											
1N270	G			DS	80	1.0	200M	100*					
1N273	G			DS	30	1.0	100M	20*					
1N276	G			DS	50	1.0	40M	100*					
1N277	G			DS	100	1.0	100M	75*	0.3				
1N278	G			DS	50	1.0	20M	125*					
1N279	G			DS	30	1.0	100M	200*					
1N281	G			DS	60	1.0	100M	30*					

†See page 1-1a for ordering information.



**1N282-1N352**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES						
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>			
					SIGNAL DIODES					REFERENCE DIODES						
					PRV (volts)	V <sub>F</sub> (volts)	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range			
1N282	G	UHF Mixer; NF = 12.5 dB Microwave X-K band Mixer; NF = 11.3 dB Microwave X-K band Mixer; NF = 11.3 dB		DS	20	1.0	40M	20M	20*							
1N283	G			DS		1.0								200M	20*	
1N285	S															
1N286	S															
1N286A	S															
1N287	G			DS		60								1.0	20M	1.5M
1N288	G			DS		85								1.0	40M	350*
1N289	G			DS		85								1.0	20M	50*
1N290	G			DS		120								1.0	5.0M	100*
1N291	G			DS		120								1.0	40M	100*
1N292	G	DS	75	1.0	100M	200*										
1N294	G	DS	60	1.0	5.0M	10*										
1N294A	G			DS	60	1.0	5.0M	10*	10*							
1N295	G			DS	40		200*									
1N295A	G			DS	40		200*									
1N296	G			DS	40		200M									
1N297	G			DS	80	1.0	3.5M	10*								
1N297A	G			DS	80	1.0	3.5M	10*								
1N298	G			DS	70	2.0	30M									
1N298A	G			DS	30	2.0	30M	250*								
1N299	G			DS		0.5	3.0M	200M								
1N300	S			DS	15	1.0	15M	0.001*								
1N300A	S	DS	15	1.0	30M	0.001*										
1N300B	S	DS	15	1.0	50M	0.001*										
1N301	S			DS	70	1.0	5.0M	0.05*								
1N301A	S			DS	70	1.0	18M	0.05*								
1N301B	S			DS	70	1.0	50M	0.01*								
1N302	S			DS	225	1.0	1.0M	0.2*								
1N302A	S			DS	225	1.0	5.0M	0.2*								
1N303	S			DS	125	1.0	3.0M	0.1*								
1N303A	S			DS	125	1.0	12M	0.1*								
1N303B	S			DS	125	1.0	50M	0.1*								
1N304	S			DS	55	1.5	2.0M	2.0*								
1N305	G			DS	60	0.8	100M	20*								
1N306	G	DS	15	0.8	100M	2.0*										
1N307	G	DS	125	1.0	100M	5.0*										
1N308	G	Microwave Mixer - to 12,000 MHz; NF = 10.5 dB		DS	8.0	1.0	300M	500*								
1N309	G			DS	40	1.0	100M	100*								
1N310	G			DS	125	1.0	40M	20*								
1N311	S			DS	60	1.0	70M	50*								
1N312	G			DS	125	1.0	40M	10*								
1N313	G			DS				0.05M								
1N314	G			R	300	0.48	0.075	0.3	25							
1N315	G			R	200	0.48	0.1	0.16	25							
1N315A	G			R	50	2.0	0.2		2.0							
1N316	S			1N4001	1N4001	R	100	2.0	0.2	2.0						
1N317	S	1N4002	1N4001	R	200	2.0	0.2	2.0								
1N318	S	1N4003	1N4001	R	200	2.0	0.2	2.0								
1N319	S	1N4004	1N4001	R	350	2.0	0.2	2.0								
1N320	S	1N4005	1N4001	R	500	2.0	0.2	2.0								
1N321	S	1N4007	1N4001	R	850	1.2	0.25	1.0	10							
1N322	S			R	850	1.2	0.25	1.0	10							
1N323	S			R	50	2.0	0.4	2.0								
1N324	S			R	100	2.0	0.4	2.0								
1N325	S			R	200	2.0	0.4	2.0								
1N326	S			R	350	2.0	0.4	2.0								
1N327	S			R	500	1.2	0.4	2.0								
1N328	S			R	850	1.2	0.4	0.06	10							
1N329	S			R	1000	1.2	0.4	0.06	10							
1N330	S			DS	32	1.0	3.0M	0.03*								
1N331	S			MR1124	MR1120	DS	16	1.0	5.0M	0.01*						
1N332	S	R	400			2.0	0.4	0.2	10							
1N333	S	R	400			2.0	0.2	0.2	5.0							
1N334	S	R	300			2.0	0.4	0.2	10							
1N335	S	R	300			2.0	0.2	0.2	5.0							
1N336	S	R	200			2.0	0.4	0.1	10							
1N337	S	R	200			2.0	0.2	0.1	5.0							
1N338	S	R	100			2.0	1.0	0.2	20							
1N339	S	R	100			2.0	0.4	0.1	10							
1N340	S	R	100			2.0	0.2	0.1	5.0							
1N341	S	MR1124	MR1120	R	400	2.0	0.4	0.5	10							
1N342	S	MR1124	MR1120	R	400	2.0	0.2	0.5	5.0							
1N343	S	MR1123	MR1120	R	300	2.0	0.4	0.5	10							
1N344	S	MR1123	MR1120	R	300	2.0	0.2	0.5	5.0							
1N345	S	MR1122	MR1120	R	200	2.0	0.4	0.5	10							
1N346	S	MR1122	MR1120	R	200	2.0	0.2	0.5	5.0							
1N347	S	MR1121	MR1120	R	100	2.0	1.0	0.5	20							
1N348	S	MR1121	MR1120	R	100	2.0	0.4	0.5	10							
1N349	S	MR1121	MR1120	R	100	2.0	0.2	0.5	5.0							
1N350	S			DS	70	1.0	20M	0.03*								
1N351	S			DS	120	1.0	20M	0.03*								
1N352	S			DS	170	1.0	20M	0.05*								



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N353	S			DS	225	1.0	20M	0.1*					
1N354	S			DS	325	1.0	20M	0.1*					
1N355	G			DS	100	1.0	4.0M	50*					
1N358	S			DS									
1N358A	S			DS									
1N359	S	1N4001	1N4001	R	50	2.0	0.1		2.0				
1N360	S	1N4002	1N4001	R	100	2.0	0.1		2.0				
1N361	S	1N4003	1N4001	R	200	2.0	0.1		2.0				
1N362	S	1N4004	1N4001	R	350	2.0	0.1		2.0				
1N363	S	1N4005	1N4001	R	500	2.0	0.1		2.0				
1N364	S	1N4007	1N4001	R	850	1.2	0.1	0.06	10				
1N365	S	1N4007	1N4001	R	1000	1.2	0.1	0.06	10				
1N367	G			DS	15								
1N368	R			R	200	0.5	0.1	0.3	25				
1N368A	G			R	200	0.5	0.1	0.16	25				
1N369	S	Microwave S-X-band Detector											
1N369A	S	Microwave L-X-band Detector											
1N370	S	1N5221B	1N5221	DZ						1.8	20	±20	200M
1N371	S	1N5221A	1N5221	DZ						2.4	20	±20	200M
1N372	S	1N5225A	1N5221	DZ						2.9	15	±20	200M
1N373	S	1N5227A	1N5221	DZ						3.5	10	±20	200M
1N374	S	1N5229A	1N5221	DZ						4.1	10	±20	200M
1N375	S	1N5230A	1N5221	DZ						4.8	10	5.0	200M
1N376	S	1N5233A	1N5221	DZ						5.8	10	5.0	200M
1N377	S	1N5236A	1N5221	DZ						7.1	13	5.0	200M
1N378	S	1N5238A	1N5221	DZ						8.75	14	0.2	200M
1N379	S	1N5240A	1N5221	DZ						10.5	15	0.2	200M
1N380	S	1N5243A	1N5221	DZ						12.8	14	0.2	200M
1N381	S	1N5246A	1N5221	DZ						15.8	15	0.2	200M
1N382	S	1N5249A	1N5221	DZ						19	10	0.2	200M
1N383	S	1N5252A	1N5221	DZ						23.5	15	0.2	200M
1N384	S	1N5255A	1N5221	DZ						28.5	12	0.2	200M
1N385	S	1N5258A	1N5221	DZ						34.5	13	0.2	200M
1N386	S	1N5260A	1N5221	DZ						41	10	0.2	200M
1N387	S	1N5261A	1N5221	DZ						48.5	11	0.2	200M
1N388	S	1N5264A	1N5221	DZ						58	10	0.2	200M
1N389	S	1N5266A	1N5221	DZ						71	14	0.2	200M
1N390	S	1N5269A	1N5221	DZ						87.5	15	0.2	200M
1N391	S	1N5271A	1N5221	DZ						105	15	0.2	200M
1N392	S	1N5274A	1N5221	DZ						127.5	14	0.2	200M
1N393	S	1N5277A	1N5221	DZ						157.5	14	0.2	200M
1N394	S	1N5280A	1N5221	DZ						190	10	0.2	200M
1N395	S	.5M115ZSB10	†	DZ						235	15	0.1	200M
1N396	S	.5M140ZSB10	†	DZ						285	12	0.1	200M
1N397	S	.5M170ZSB10	†	DZ						345	13	0.1	200M
1N398	S	.5M205ZSB10	†	DZ						410	10	0.1	200M
1N399	S	.5M160ZSC10	†	DZ						485	11	0.1	200M
1N400	S	.5M195ZSC10	†	DZ						580	10	0.1	200M
1N401	S			DS	1.5								
1N402	S			DS	2.0								
1N403	S			DS	2.5								
1N404	S			DS	3.1								
1N405	S			DS	3.7	1.0	225M						
1N406	S			DS	4.3	1.0	200M						
1N407	S			DS	5.2	1.0	170M						
1N408	S			DS	6.2	1.0	130M						
1N411B	S	MR1810 SB		R	50	1.5	50	25	525				
1N412B	S	MR1811 SB		R	100	1.5	50	25	525				
1N413B	S	MR1813 SB		R	200	1.5	50	25	525				
1N415B	S	Microwave X-band Mixer; NF = 11.4 to 6.5 dB											
1N415C	S	Microwave X-band Mixer; NF = 11.4 to 6.5 dB											
1N415D	S	Microwave X-band Mixer; NF = 11.4 to 6.5 dB											
1N415E	S	Microwave X-band Mixer; NF = 11.4 to 6.5 dB											
1N415F	S	Microwave X-band Mixer; NF = 11.4 to 6.5 dB											
1N415G	S	Microwave X-band Mixer; NF = 11.4 to 6.5 dB											
1N415H	S	Microwave Mixer - to 9000 MHz; NF = 6.0 dB											
1N416B	S	Microwave S-band Mixer; NF = 10.3 to 5.5 dB											
1N416C	S	Microwave S-band Mixer; NF = 10.3 to 5.5 dB											
1N416D	S	Microwave S-band Mixer; NF = 10.3 to 5.5 dB											
1N416E	S	Microwave S-band Mixer; NF = 10.3 to 5.5 dB											
1N416F	S	Microwave S-band Mixer; NF = 10.3 to 5.5 dB											
1N416G	S	Microwave S-band Mixer; NF = 10.3 to 5.5 dB											
1N417	G			DS	60				0.3				
1N418	G			DS	60	1.0	7.0M		0.3				
1N419	G			DS	80	1.0	125M		0.3				
1N429	S		1N429	DR						6.2		7.5	
1N430	S	1N3156	1N3154	DR						8.4	0.002	10	-55/100
1N430A	S	1N3157	1N3154	DR						8.4	0.001	10	-55/100
1N430B	S	1N3157A	1N3154	DR						8.4	0.001	10	-55/150
1N431	S			DS	68	0.55	15M						
1N432	S			DS	40	1.0	10M	5.0N					
1N432A	S			DS	40	1.0	20M	5.0N					
1N433	S			DS	145	1.0	3.0M	0.1*					

†See page 1-1a for ordering information.



**1N433A-1N483**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N433A	S			DS	145	1.0	10M	0.1*					
1N434	S			DS	180	1.0	2.0M	0.1*					
1N434A	S			DS	180	1.0	7.0M	0.1*					
1N435	G			DS	40			0.3M					
1N440	S	1N4002	1N4001	R	100	1.5	0.3	0.3					
1N440B	S	1N4002	1N4001	R	100	1.5		0.3	15				
1N441	S	1N4003	1N4001	R	200	1.5	0.3	0.75					
1N441B	S	1N4003	1N4001	R	200	1.5			15				
1N442	S	1N4004	1N4001	R	300	1.5	0.3	1.0					
1N442B	S	1N4004	1N4001	R	300	1.5		0.001	15				
1N443	S	1N4004	1N4001	R	400	1.5	0.3	1.5					
1N443B	S	1N4004	1N4001	R	400	1.5			15				
1N444	S	1N4005	1N4001	R	500	1.5	0.3	1.75					
1N444B	S	1N4005	1N4001	R	500	1.5			15				
1N445	S	1N4005	1N4001	R	600	1.5	0.3	2.0					
1N445B	S	1N4005	1N4001	R	600	1.5		0.002	15				
1N446	S	Microwave K-Ka-band Detector											
1N447	G				DS	30	1.0	25M	20*				
1N448	G				DS	100	1.0	25M	30*				
1N449	G				DS	30	1.0	50M	10*				
1N450	G				DS	100	1.0	50M	30*				
1N451	G				DS	150	1.0	50M	150*				
1N452	G				DS	30	1.0	100M	30*				
1N453	G				DS	100	1.0	100M	30*				
1N454	G			DS	50	1.0	200M	50*					
1N455	G			DS	30	1.0	300M	30*					
1N456	S			DS	25	1.0	40M	25N					
1N456A	S			DS	25	1.0	100M	25N					
1N457	S			DS	60	1.0	20M	25N					
1N457A	S			DS	60	1.0	100M	25N					
1N458	S			DS	125	1.0	2.0M	25N					
1N458A	S			DS	125	1.0	100M	25N					
1N459	S			DS	175	1.0	3.0M	25N					
1N459A	S			DS	175	1.0	100M	25N					
1N460	S			DS	90	1.0	5.0M	0.1*					
1N460A	S			DS	90	1.0	15M	0.1*					
1N461	S			DS	25	1.0	15M	0.5*					
1N461A	S			DS	25	1.0	100M	0.5*					
1N462	S			DS	60	1.0	5.0M	0.5*					
1N462A	S			DS	60	1.0	100M	0.5*					
1N463	S			DS	175	1.0	1.0M	0.5*					
1N463A	S			DS	175	1.0	100M	0.5*					
1N464	S			DS	125	1.0	3.0M	0.5*					
1N464A	S			DS	125	1.0	100M	0.5*					
1N465	S	1N5223A	1N5221	DZ						3.2	5.0		200M
1N465A	S	1N5223B	1N5221	DZ						2.7	5.0	5.0	200M
1N465B	S	.5M2.7ZS1		DZ						2.7	5.0	1.0	200M
1N466	S	1N5226A	1N5221	DZ						3.9	5.0		200M
1N466A	S	1N5226B	1N5221	DZ						3.3	5.0	5.0	200M
1N466B	S	.5M3.3ZS1		DZ						3.3	5.0	1.0	200M
1N467	S	1N5228B	1N5221	DZ						4.5	5.0		200M
1N467A	S	1N5228B	1N5221	DZ						3.9	5.0	5.0	200M
1N467B	S	.5M3.9ZS1		DZ						3.9	5.0	1.0	200M
1N468	S	1N5230A	1N5221	DZ						5.4	5.0		200M
1N468A	S	1N5230B	1N5221	DZ						4.7	5.0	5.0	200M
1N468B	S	.5M4.7ZS1		DZ						4.7	5.0	1.0	200M
1N469	S	1N5232B	1N5221	DZ						6.4	5.0		200M
1N469A	S	1N5232B	1N5221	DZ						5.6	5.0	5.0	200M
1N469B	S	.5M5.6ZS1		DZ						5.6	6.0	1.0	200M
1N470	S	1N5235B	1N5221	DZ						8.0	5.0		200M
1N470A	S	1N5235B	1N5221	DZ						6.8	5.0	5.0	200M
1N470B	S	.5M6.8ZS1		DZ						6.8	5.0	1.0	200M
1N471	S	.5M3.4ZS10		DZ						3.9	5.0		200M
1N471A	S	.5M3.3ZS5		DZ						3.3	5.0	5.0	200M
1N472	S	.5M4.1ZS10		DZ						4.5	5.0		200M
1N472A	S	.5M3.9ZS5		DZ						3.9	5.0	5.0	200M
1N473	S	.5M4.8ZS10		DZ						5.4	5.0		200M
1N473A	S	.5M4.7ZS5		DZ						4.7	5.0	5.0	200M
1N474	S	.5M5.8ZS10		DZ						6.4	5.0		200M
1N474A	S	.5M5.6ZS5		DZ						5.6	5.0	5.0	200M
1N475	S	.5M7.1ZS10		DZ						8.0	5.0		150M
1N475A	S	.5M6.8ZS5		DZ						6.8	5.0	5.0	200M
1N476	G			DS	90	1.0	2.5M	11*					
1N477	G			DS	90	1.0	2.5M	11*					
1N478	G			DS	90	1.0	5.0M	7.0*					
1N479	G			DS	90	1.0	5.0M	7.0*					
1N480	G			DS	60	1.0	5.0M						
1N481	G			R*	200	0.5	0.1	1.9	0.5				
1N482	S			DS	36	1.1*	100M	0.25*	25				
1N482A	S			DS	36	1.0	100M	25N					
1N482B	S			DS	36	1.0	100M	25N					
1N483	S			DS	70	1.0	100M	25N					

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N483A	S			DS	70	1.0	100M	25N					
1N483B	S			DS	70	1.0	100M	25N					
1N484	S			DS	130	1.1	100M	0.25*					
1N484A	S			DS	130	1.0	100M	25N					
1N484B	S			DS	130	1.0	100M	25N					
1N485	S			DS	180	1.1	100M	0.25*					
1N485A	S			DS	180	1.0	100M	25N					
1N485B	S			DS	180	1.0	100M	25N					
1N486	S			DS	225	1.1	100M	0.25*					
1N486A	S			DS	225	1.0	100M	0.05*					
1N486B	S			DS	225	1.0	100M	0.05*					
1N487	S			DS	300	1.1	100M	0.25*					
1N487A	S			DS	300	1.0	100M	0.1*					
1N487B	S			DS	300	1.0	100M	0.1*					
1N488	S			DS	380	1.1	100M	0.25*					
1N488A	S			DS	380	1.0	100M	0.1*					
1N488B	S			DS	380	1.0	100M	0.1*					
1N490	G			DS	90	1.0	5.0M		0.5				
1N497	G			DS	30	1.0	100M	20*					
1N498	G			DS	60	1.0	100M	25*					
1N499	G			DS	75	1.0	100M	30*					
1N500	G			DS	80	1.0	100M	40*					
1N501	G			DS	100	1.0	100M	40*					
1N502	G			DS	120	1.0	100M	50*					
1N503	S			R	50	1.2	0.33	0.5					
1N504	S			R	100	1.2	0.33	0.5					
1N505	S			R	200	1.2	0.33	0.5					
1N506	S			R	300	1.2	0.33	0.5					
1N507	S			R	400	1.2	0.33	0.25					
1N508	S			R	600	1.2	0.33	0.25					
1N509	S			R	800	1.2	0.33	0.25					
1N510	S			R	1000	1.2	0.33	0.25					
1N511	S			R	50	1.2	1.0	0.5					
1N512	S			R	100	1.2	1.0	0.5					
1N513	S			R	200	1.2	1.0	0.5					
1N514	S			R	300	1.2	1.0	0.5					
1N515	S			R	400	1.2	1.0	0.25					
1N516	S			R	600	1.2	1.0	0.25					
1N517	S			R	800	1.2	1.0	0.25					
1N518	S			R	1000	1.2	1.0	0.25					
1N519	S			R	50	1.2	1.25	0.5					
1N520	S			R	100	1.2	1.25	0.5					
1N521	S			R	200	1.2	1.25	0.5					
1N522	S			R	300	1.2	1.25	0.5					
1N523	S			R	400	1.2	1.25	0.25					
1N524	S			R	600	1.2	1.25	0.25					
1N525	S			R	800	1.2	1.25	0.25					
1N526	S			R	1000	1.2	1.25	0.25					
1N527	G			DS	10	0.3	1.0M	50*					
1N530	S	1N4002	1N4001	R	100	2.0	0.3	0.003	3.0				
1N531	S	1N4003	1N4001	R	200	2.0	0.3		3.0				
1N532	S	1N4004	1N4001	R	300	2.0	0.3	0.01	3.0				
1N533	S			R	400	2.0	0.3	0.015	3.0				
1N534	S	1N4005	1N4001	R	500	2.0	0.3		3.0				
1N535	S	1N4005	1N4001	R	600	2.0	0.3	0.02	3.0				
1N536	S	1N4001	1N4001	R	50	0.5	0.25	0.4	15				
1N537	S	1N4002	1N4001	R	100	0.4	0.25	0.5	15				
1N538	S	1N4003	1N4001	R	200	0.3	0.25	0.5	15				
1N539	S	1N4004	1N4001	R	300	0.5	0.25	0.3	15				
1N540	S	1N4004	1N4001	R	400	0.5	0.25	0.3	15				
1N541	G			DS	45	2.2	10M	18*					
1N542	G			DS									
1N543	S			R	1000	10	0.005	0.1					
1N543A	S			R	1000	8.0	0.025	0.1					
1N544	S			R	1000	10	0.015	0.1					
1N544A	S			R	1000	10	0.075	0.1					
1N547	S	1N4005	1N4001	R	600	1.1	0.25	0.35	15				
1N548	S			R	900	1.1	0.3	0.35	15				
1N549	S			R	1200	1.1	0.3	0.35	15				
1N550	S	MR1121	MR1120	R	100	1.5	0.5		4.0				
1N551	S	MR1122	MR1120	R	200	1.5	0.5	0.001	4.0				
1N552	S	MR1123	MR1120	R	300	1.5	0.5		4.0				
1N553	S	MR1124	MR1120	R	400	1.5	0.5		4.0				
1N554	S	MR1125	MR1120	R	500	1.5	0.5		4.0				
1N555	S			R	600	1.5	0.5	0.005	4.0				
1N560	S	1N4006	1N4001	R	800	1.75	0.25	0.015	2.0				
1N561	S	1N4007	1N4001	R	1000	1.75	0.25	0.02	2.0				
1N562	S	MR1128	MR1120	R	800	1.75	0.4	0.015	3.0				
1N563	S	MR1130	MR1120	R	1000	1.75	0.4	0.02	3.0				
1N566	G			DS	220	1.0	20M	0.2M					
1N567	S			DS	100	1.0	150M	0.15M	0.3				
1N568	G			DS	7.0	0.32	5.0M	0.1M	0.08				



**1N569-1N660**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N569	G			DS	12	0.5	250M	0.05M					
1N570	S			R	1250	1.0	37.5	0.1					
1N571	G			DS		1.0	200M	100*	4.0				
1N573	G			R	380	0.15	0.25						
1N574	G			R	380	0.15	0.3						
1N575	G			R	380	0.3	0.35						
1N575A	G			R	380	0.15	0.35						
1N576A	G			R	380	0.15	0.4						
1N581	G			R	380	0.15	0.25						
1N582	G			R	380	0.15	0.3						
1N583	G			R	380	0.15	0.35						
1N584	G			R	380	0.15	0.4						
1N588	S			R	1500	1.75	0.1	0.1	5.0				
1N589	S	MR991A	MR990A	R	1500	1.75	0.25	0.1	10				
1N590	S			R	1500	8.0	0.075	0.1					
1N591	S			R	1500	8.0	0.075	0.1					
1N596	S	1N4005	1N4001	R	600	3.0	0.125	0.025	1.0				
1N597	S	1N4006	1N4001	R	800	3.0	0.125	0.025	1.0				
1N598	S	1N4007	1N4001	R	1000	3.0	0.125	0.025	1.0				
1N599	S	1N4001	1N4001	R	50	1.5	0.3	0.025	2.0				
1N599A	S	1N4001	1N4001	R	50	1.5	0.3	0.001	2.0				
1N600	S	1N4002	1N4001	R	100	1.5	0.3	0.025	2.0				
1N600A	S	1N4002	1N4001	R	100	1.5	0.3	0.001	2.0				
1N601	S	1N4003	1N4001	R	150	1.5	0.3	0.025	2.0				
1N601A	S	1N4003	1N4001	R	150	1.5	0.3	0.001	2.0				
1N602	S	1N4003	1N4001	R	200	1.5	0.3	0.025	2.0				
1N602A	S	1N4003	1N4001	R	200	1.5	0.3	0.001	2.0				
1N603	S	1N4004	1N4001	R	300	1.5	0.3	0.025	2.0				
1N603A	S	1N4004	1N4001	R	300	1.5	0.3	0.001	2.0				
1N604	S	1N4004	1N4001	R	400	1.5	0.3	0.025	2.0				
1N604A	S	1N4004	1N4001	R	400	1.5	0.3		2.0				
1N605	S	1N4005	1N4001	R	500	1.5	0.3	0.025	2.0				
1N605A	S	1N4005	1N4001	R	500	1.5	0.3	0.002	2.0				
1N606	S	1N4005	1N4001	R	600	1.5	0.3	0.025	2.0				
1N606A	S	1N4005	1N4001	R	600	1.5	0.3		2.0				
1N607	S			R	50	1.5	0.8	0.025	3.0				
1N607A	S	MR1120	MR1120	R	50	1.5	0.8	0.001	3.0				
1N608	S			R	100	1.5	0.8	0.025	3.0				
1N608A	S	MR1121	MR1120	R	100	1.5	0.8	0.001	3.0				
1N609	S			R	150	1.5	0.8	0.025	3.0				
1N609A	S	MR1122	MR1120	R	150	1.5	0.8	0.001	3.0				
1N610	S			R	200	1.5	0.8	0.025	3.0				
1N610A	S	MR1122	MR1120	R	200	1.5	0.8	0.001	3.0				
1N611	S			R	300	1.5	0.8	0.025	3.0				
1N611A	S	MR1123	MR1120	R	300	1.5	0.8	0.001	3.0				
1N612	S			R	400	1.5	0.8	0.025	3.0				
1N612A	S	MR1124	MR1120	R	400	1.5	0.8	1.5	3.0				
1N613	S			R	500	1.5	0.8	0.025	3.0				
1N613A	S	MR1125	MR1120	R	500	1.5	0.8	0.002	3.0				
1N614	S			R	600	1.5	0.8	0.025	3.0				
1N614A	S	MR1126	MR1120	R	600	1.5	0.8	2.5	3.0				
1N615	G			R	300		0.075	1.2	25				
1N616	G			DS	20	1.0	8.0M	0.4M					
1N617	G			DS	115	1.0	3.0M	11*					
1N618	G			DS	115	1.0	5.0M	7.0*					
1N619	S			DS	30	1.0	3.0M	0.08*					
1N622	S			DS	150	1.0	7.0M	0.16*					
1N625	S			DS		1.5	4.0M	1.0*	1.0				
1N626	S			DS		1.5	4.0M	1.0*	1.0				
1N627	S			DS		1.5	4.0M	1.0*	1.0				
1N628	S			DS		1.5	4.0M	1.0*	1.0				
1N629	S			DS		1.5	4.0M	1.0*	1.0				
1N630	S	Microwave L-X-band Detector											
1N631	G			DS	60				0.3				
1N632	G			DS	60	1.0	7.0M		0.3				
1N633	G			DS	80	1.0	125M		0.3				
1N634	G			DS	100	1.0	50M	45*					
1N635	G			DS	150	1.0	50M	175*					
1N636	G			DS	60	1.0	2.5M	10*					
1N643	S			DS	175	1.0	10M	1.0*	0.3				
1N643A	S			DS	175	1.0	100M	1.0*	0.3				
1N645	S			DS	225	1.0	400M	0.2*					
1N645A	S	1N4003	1N4001	DS	225	1.0	400M	0.05*					
1N646	S	1N4004	1N4001	DS	300	1.0	400M	0.2*					
1N647	S	1N4004	1N4001	DS	400	1.0	400M	0.2*					
1N648	S	1N4005	1N4001	DS	500	1.0	400M	0.2*					
1N649	S	1N4005	1N4001	DS	600	1.0	400M	0.2*					
1N658	S			DS	100	1.0	100M	0.05*	0.3				
1N658A	S			DS	120	1.0	100M	25N	0.3				
1N659	S			DS	50	1.0	6.0M	5.0*	0.3				
1N659A	S			DS	60	1.0	10M	25N	0.3				
1N660	S			DS	100	1.0	6.0M	5.0*	0.3				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N660A	S			DS	120	1.0	10M	25N	0.3				
1N661	S			DS	200	1.0	6.0M	10*	0.3				
1N661A	S			DS	240	1.0	10M	25N	0.3				
1N662	S			DS	80	1.0	10M	1.0*	0.5				
1N662A	S			DS	80	1.0	100M	1.0*	0.3				
1N663	S			DS	80	1.0	100M	5.0*	0.5				
1N663A	S			DS	80	1.0	100M	0.1*	0.3				
1N664	S	1N5237A	1N5221	DZ						8.2	10	10	250M
1N665	S	1N5242A	1N5221	DZ						12	10	10	0.25W
1N666	S	1N5245B	1N5221	DZ						15	5.0	5.0	0.25W
1N667	S	1N5248A	1N5221	DZ						18	5.0	10	0.25W
1N668	S	1N5251A	1N5221	DZ						22	5.0	10	0.25W
1N669	S	1N5254A	1N5221	DZ						27	5.0	10	0.25W
1N670	S	1N5266B	1N5221	DZ						68	1.0	5.0	250M
1N671	S	1N5271A	1N5221	DZ						100	1.0	10	0.25W
1N672	S	1N5276A	1N5221	DZ						150	1.0	10	0.25W
1N673	S		1N5221	DS	350	1.0	250M	1.0*					
1N674	S	1N5230A	1N5221	DZ						4.7	20	10	250M
1N675	S	1N5234B	1N5221	DZ						6.2	20	5.0	250M
1N676	S	1N4002	1N4001	R	100	1.0	0.075	0.2	3.0				
1N677	S	1N4002	1N4001	R	100	1.0	0.15	0.2	5.0				
1N678	S	1N4003	1N4001	R	200	1.0	0.075	0.2	3.0				
1N679	S	1N4003	1N4001	R	200	1.0	0.15	0.2	5.0				
1N681	S	1N4004	1N4001	R	300	1.0	0.075	0.2	3.0				
1N682	S	1N4004	1N4001	R	300	1.0	0.15	0.2	5.0				
1N683	S	1N4004	1N4001	R	400	1.0	0.075	0.2	3.0				
1N684	S	1N4004	1N4001	R	400	1.0	0.15	0.2	5.0				
1N685	S	1N4005	1N4001	R	500	1.0	0.075	0.2	3.0				
1N686	S	1N4005	1N4001	R	500	1.0	0.15	0.2	5.0				
1N687	S	1N4005	1N4001	R	600	1.0	0.075	0.2	3.0				
1N689	S	1N4005	1N4001	R	600	1.0	0.15	0.2	5.0				
1N690	S			DS	36	1.0	400M	0.25*	0.8				
1N691	S			DS	70	1.0	400M	0.25*	0.8				
1N692	S			DS	100	1.0	400M	0.25*	0.8				
1N693	S			DS	130	1.0	400M	0.25*	0.8				
1N695	G			DS	20	1.0	100M	2.0*	0.3				
1N695A	G			DS	25	0.5	10M	2.0*	0.3				
1N696	S			DS	30	1.0	10M	15N	5.0				
1N697	S			DS		1.0	0.25A	1.0*					
1N698	G			DS	25	0.65	30M	160*	0.5				
1N699	G			DS	80	1.0	100M	160*	0.3				
1N701	S	1N5240B *	1N5221	DZ						10.5	10		250M
1N702	S	1N5223A *	1N5221	DZ						3.2	5.0		250M
1N702A	S	1N5223B *	1N5221	DZ						2.9	5.0		250M
1N703	S	1N5227A *	1N5221	DZ						3.9	5.0		250M
1N703A	S	1N5227B *	1N5221	DZ						3.67	5.0		250M
1N704	S	1N5229A *	1N5221	DZ						4.5	5.0		250M
1N704A	S	1N5229B *	1N5221	DZ						4.3	5.0		250M
1N705	S	1N5230A *	1N5221	DZ						5.4	5.0		250M
1N705A	S	1N5230B *	1N5221	DZ						5.12	5.0		250M
1N706	S	1N5232A *	1N5221	DZ						6.4	5.0		250M
1N706A	S	1N5232B *	1N5221	DZ						6.1	5.0		250M
1N707	S	1N5236A *	1N5221	DZ						8.0	5.0		250M
1N707A	S	1N5236B *	1N5221	DZ						7.55	5.0		250M
1N708	S	1N5232A *	1N5221	DZ						25	10		250M
1N708A	S	1N5232B *	1N5221	DZ						25	5.0		250M
1N709	S	1N5234A *	1N5221	DZ						25	10		250M
1N709A	S	1N5234B *	1N5221	DZ						25	5.0		250M
1N710	S	1N5235A *	1N5221	DZ						25	10		250M
1N710A	S	1N5235B *	1N5221	DZ						25	5.0		250M
1N711	S	1N5236A *	1N5221	DZ						25	10		250M
1N711A	S	1N5236B *	1N5221	DZ						25	5.0		250M
1N712	S	1N5237A *	1N5221	DZ						25	10		250M
1N712A	S	1N5237B *	1N5221	DZ						25	5.0		250M
1N713	S	1N5239A *	1N5221	DZ						12	10		250M
1N713A	S	1N5239B *	1N5221	DZ						12	5.0		250M
1N714	S	1N5240A *	1N5221	DZ						12	10		250M
1N714A	S	1N5240B *	1N5221	DZ						12	5.0		250M
1N715	S	1N5241A *	1N5221	DZ						12	10		250M
1N715A	S	1N5241B *	1N5221	DZ						12	5.0		250M
1N716	S	1N5242A *	1N5221	DZ						12	10		250M
1N716A	S	1N5242B *	1N5221	DZ						12	5.0		250M
1N717	S	1N5243A *	1N5221	DZ						12	10		250M
1N717A	S	1N5243B *	1N5221	DZ						12	5.0		250M
1N718	S	1N5245A *	1N5221	DZ						12	10		250M
1N718A	S	1N5245B *	1N5221	DZ						12	5.0		250M
1N719	S	1N5246A *	1N5221	DZ						12	10		250M
1N719A	S	1N5246B *	1N5221	DZ						12	5.0		250M
1N720	S	1N5248A *	1N5221	DZ						12	10		250M
1N720A	S	1N5248B *	1N5221	DZ						12	5.0		250M
1N721	S	1N5250A *	1N5221	DZ						4.0	10		250M
1N721A	S	1N5250B *	1N5221	DZ						4.0	5.0		250M

Replacement \* denotes exact device type replacement available on request.



**1N722-1N766**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N722	S	1N5251A*	1N5221	DZ						22	4.0	10	250M
1N722A	S	1N5251B*	1N5221	DZ						22	4.0	5.0	250M
1N723	S	1N5252A*	1N5221	DZ						24	4.0	10	250M
1N723A	S	1N5252B*	1N5221	DZ						24	4.0	5.0	250M
1N724	S	1N5254A*	1N5221	DZ						27	4.0	10	250M
1N724A	S	1N5254B*	1N5221	DZ						27	4.0	5.0	250M
1N725	S	1N5256A*	1N5221	DZ						30	4.0	10	250M
1N725A	S	1N5256B*	1N5221	DZ						30	4.0	5.0	250M
1N726	S	1N5257A*	1N5221	DZ						33	4.0	10	250M
1N726A	S	1N5257B*	1N5221	DZ						33	4.0	5.0	250M
1N727	S	1N5258A*	1N5221	DZ						36	4.0	10	250M
1N727A	S	1N5258B*	1N5221	DZ						36	4.0	5.0	250M
1N728	S	1N5259A*	1N5221	DZ						39	4.0	10	250M
1N728A	S	1N5259B*	1N5221	DZ						39	4.0	5.0	250M
1N729	S	1N5260A*	1N5221	DZ						43	4.0	10	250M
1N729A	S	1N5260B*	1N5221	DZ						43	4.0	5.0	250M
1N730	S	1N5261A*	1N5221	DZ						47	4.0	10	250M
1N730A	S	1N5261B*	1N5221	DZ						47	4.0	5.0	250M
1N731	S	1N5262A*	1N5221	DZ						51	4.0	10	250M
1N731A	S	1N5262B*	1N5221	DZ						51	4.0	5.0	250M
1N732	S	1N5263A*	1N5221	DZ						56	4.0	10	250M
1N732A	S	1N5263B*	1N5221	DZ						56	4.0	5.0	250M
1N733	S	1N5265A*	1N5221	DZ						62	2.0	10	250M
1N733A	S	1N5265B*	1N5221	DZ						62	2.0	5.0	250M
1N734	S	1N5266A*	1N5221	DZ						68	2.0	10	250M
1N734A	S	1N5266B*	1N5221	DZ						68	2.0	5.0	250M
1N735	S	1N5267A*	1N5221	DZ						75	2.0	10	250M
1N735A	S	1N5267B*	1N5221	DZ						75	2.0	5.0	250M
1N736	S	1N5268A*	1N5221	DZ						82	2.0	10	250M
1N736A	S	1N5268B*	1N5221	DZ						82	2.0	5.0	250M
1N737	S	1N5270A*	1N5221	DZ						91	1.0	10	250M
1N737A	S	1N5270B*	1N5221	DZ						91	1.0	5.0	250M
1N738	S	1N5271A*	1N5221	DZ						100	1.0	10	250M
1N738A	S	1N5271B*	1N5221	DZ						100	1.0	5.0	250M
1N739	S	1N5272A*	1N5221	DZ						110	1.0	10	250M
1N739A	S	1N5272B*	1N5221	DZ						110	1.0	5.0	250M
1N740	S	1N5273A*	1N5221	DZ						120	1.0	10	250M
1N740A	S	1N5273B*	1N5221	DZ						120	1.0	5.0	250M
1N741	S	1N5274A*	1N5221	DZ						130	1.0	10	250M
1N741A	S	1N5274B*	1N5221	DZ						130	1.0	5.0	250M
1N742	S	1N5276A*	1N5221	DZ						150	1.0	10	250M
1N742A	S	1N5276B*	1N5221	DZ						150	1.0	5.0	250M
1N743	S	1N5277A*	1N5221	DZ						160	1.0	10	250M
1N743A	S	1N5277B*	1N5221	DZ						160	1.0	5.0	250M
1N744	S	1N5279A*	1N5221	DZ						180	1.0	10	250M
1N744A	S	1N5279B*	1N5221	DZ						180	1.0	5.0	250M
1N745	S	1N5281A*	1N5221	DZ						200	1.0	0	250M
1N745A	S	1N5281B*	1N5221	DZ						200	1.0	5.0	250M
1N746	S		1N702	DZ						3.3	20	10	400M
1N746A	S		1N702	DZ						3.3	20	5.0	400M
1N747	S		1N702	DZ						3.6	20	10	400M
1N747A	S		1N702	DZ						3.6	20	5.0	400M
1N748	S		1N702	DZ						3.9	20	10	400M
1N748A	S		1N702	DZ						3.9	20	5.0	400M
1N749	S		1N702	DZ						4.3	20	10	400M
1N749A	S		1N702	DZ						4.3	20	5.0	400M
1N750	S		1N702	DZ						4.7	20	10	400M
1N750A	S		1N702	DZ						4.7	20	5.0	400M
1N751	S		1N702	DZ						5.1	20	10	400M
1N751A	S		1N702	DZ						5.1	20	5.0	400M
1N752	S		1N702	DZ						5.6	20	10	400M
1N752A	S		1N702	DZ						5.6	20	5.0	400M
1N753	S		1N702	DZ						6.2	20	10	400M
1N753A	S		1N702	DZ						6.2	20	5.0	400M
1N754	S		1N702	DZ						6.8	20	10	400M
1N754A	S		1N702	DZ						6.8	20	5.0	400M
1N755	S		1N702	DZ						7.5	20	10	400M
1N755A	S		1N702	DZ						7.5	20	5.0	400M
1N756	S		1N702	DZ						8.2	20	10	400M
1N756A	S		1N702	DZ						8.2	20	5.0	400M
1N757	S		1N702	DZ						9.1	20	10	400M
1N757A	S		1N702	DZ						9.1	20	5.0	400M
1N758	S		1N702	DZ						10.0	20	10	400M
1N758A	S		1N702	DZ						10.0	20	5.0	400M
1N759	S		1N702	DZ						12.0	20	10	400M
1N759A	S		1N702	DZ						12.0	20	5.0	400M
1N761	S	1N5230A *	1N5221	DZ						5.4	10		250M
1N762	S	1N5232B *	1N5221	DZ						6.4	10		250M
1N763	S	1N5238B *	1N5221	DZ						8.0	10		250M
1N764	S	1N5238A *	1N5221	DZ						10.0	10		250M
1N765	S	1N5240A *	1N5221	DZ						12.0	5.0		250M
1N766	S	1N5243A *	1N5221	DZ						14.5	5.0		250M

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N767	S	1N5246A *	1N5221	DZ						18	5.0		250M
1N768	S	1N5249A *	1N5221	DZ						21	5.0		250M
1N769	S	1N5252A *	1N5221	DZ						27	5.0		250M
1N770	G			DS	20	0.42	5.0M	40*	0.35				
1N771	G			DS	80	1.0	100M	25*					
1N771A	G			DS	80	1.0	200M	25*					
1N771B	G			DS	80	1.0	400M	25*					
1N772	G			DS	70	1.0	100M	50*					
1N772A	G			DS	70	1.0	200M	50*					
1N773	G			DS	65	1.0	100M	10*					
1N773A	G			DS	65	1.0	200M	10*					
1N774	G			DS	60	1.0	100M	15*					
1N774A	G			DS	60	1.0	200M	15*					
1N775	G			DS	60	1.0	100M	20*					
1N776	G			DS	20	1.0	50M	200*					
1N777	G			DS	60	1.0	100M	25*	3.5				
1N778	S			DS	100	1.0	10M	0.5*	0.3				
1N779	S			DS	175	1.0	10M	0.5*	0.3				
1N781	G			DS	40	0.45	10M	5.0*	0.5				
1N781A	G			DS	40	0.45	10M	5.0*	0.5				
1N789	S			DS		1.0	10M	1.0*	0.5				
1N790	S			DS		1.0	10M	5.0*	0.25				
1N791	S			DS		1.0	50M	5.0*	0.5				
1N792	S			DS		1.0	100M	5.0*	0.5				
1N793	S			DS		1.0	10M	1.0*	0.5				
1N794	S			DS		1.0	10M	5.0*	0.25				
1N795	S			DS		1.0	50M	5.0*	0.5				
1N796	S			DS		1.0	100M	5.0*	0.5				
1N797	S			DS		1.0	10M	1.0*	0.5				
1N798	S			DS		1.0	10M	5.0*	0.25				
1N799	S			DS		1.0	50M	5.0*	0.5				
1N800	S			DS		1.0	100M	5.0*	0.5				
1N801	S			DS		1.0	10M	1.0*	0.5				
1N802	S			DS		1.0	50M	5.0*	0.5				
1N803	S			DS		1.0	10M	5.0*	0.5				
1N804	S			DS		1.0	50M	10*	0.5				
1N805	G			DS	40	1.0	3.0M	100*					
1N806	S			DS	100	1.0	4.0M	0.5*	0.3				
1N807	S			DS	180	1.0	4.0M	0.5*	0.3				
1N808	S			DS	100	1.0	100M	1.0*	0.3				
1N809	S			DS	200	1.0	100M	1.0*	0.3				
1N810	S			DS	50	1.0	10M	1.0*	50				
1N811	S			DS	20	1.0	1.0M	1.0*	0.25				
1N812	S			DS	30	1.0	1.0M	0.1*	0.25				
1N813	S			DS	15	1.0	5.0M	0.5*	0.25				
1N814	S			DS	40	1.0	2.0M	0.1*	0.25				
1N815	S			DS	15	1.5	100M	0.5*	0.25				
1N816	S			DS	6.0	1.0	100M	0.1*					
1N817	S			DS	200	1.5	6.0M	20*	1.0				
1N818	S			DS	80	1.5	30M	0.25*	0.5				
1N819	S			DS	80	1.0	200M	25N					
1N821	S		1N821	DR						6.2	0.01	7.5	-55/100
1N821A	S		1N821	DR						6.2	0.01	7.5	-55/100
1N822	S		1N821	DR						6.2	0.01	7.5	-55/100
1N823	S		1N821	DR						6.2	0.005	7.5	-55/100
1N823A	S		1N821	DR						6.2	0.005	7.5	-55/100
1N824	S		1N821	DR						6.2	0.005	7.5	-55/100
1N825	S		1N821	DR						6.2	0.002	7.5	-55/100
1N825A	S		1N821	DR						6.2	0.002	7.5	-55/100
1N826	S	1N825	1N821	DR						6.5	0.002	7.5	-55/100
1N827	S		1N821	DR						6.2	0.001	7.5	-55/100
1N827A	S		1N821	DR						6.2	0.001	7.5	-55/100
1N828	S		1N821	DR						6.5	0.001	7.5	-55/100
1N829	S		1N821	DR						6.2	0.0005	7.5	-55/100
1N830	S												
1N830A	S												
1N831	S												
1N831A	S												
1N831B	S												
1N832	S												
1N832A	S												
1N832B	S												
1N832D	S												
1N833	S												
1N833A	S												
1N835	G			DS	30	0.5	5.0M	20*	0.5				
1N836	G			DS	5.0								
1N837	S			DS		1.0	150M	0.1*	0.3				
1N837A	S			DS		1.0	150M	0.1*	0.5				
1N838	S			DS		1.0	150M	0.1*	0.5				
1N839	S			DS		1.0	150M	0.1*	0.3				
1N840	S			DS		1.0	150M	0.1*	0.3				
1N841	S			DS		1.0	150M	0.1*	0.3				

Replacement \* denotes exact device type replacement available on request.



**1N842-1N914A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @ I <sub>F</sub>		I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N842	S			DS		1.0	150M	0.1*	0.3				
1N843	S			DS		1.0	150M	0.1*	0.3				
1N844	S			DS		1.0	200M	0.1*	0.5				
1N845	S			DS		1.0	200M	0.1*	0.5				
1N846	S	1N4001	1N4001	R	50	0.6	200M	20*					
1N847	S	1N4002	1N4001	R	100	0.6	200M	20*					
1N848	S	1N4003	1N4001	R	200	0.6	200M	20*					
1N849	S	1N4004	1N4001	R	300	0.6	200M	20*					
1N850	S	1N4004	1N4001	R	400	0.6	200M	20*					
1N851	S	1N4005	1N4001	R	500	0.6	200M	20*					
1N852	S	1N4005	1N4001	R	600	0.6	200M	20*					
1N853	S	1N4006	1N4001	R	700	0.6	200M	20*					
1N854	S	1N4006	1N4001	R	800	0.6	200M	20*					
1N855	S	1N4007	1N4001	R	900	0.6	200M	20*					
1N856	S	1N4007	1N4001	R	1.0K	0.6	200M	20*					
1N857	S	1N4001	1N4001	R	50	0.6	150M	20*					
1N858	S	1N4002	1N4001	R	100	0.6	150M	20*					
1N859	S	1N4003	1N4001	R	200	0.6	150M	20*					
1N860	S	1N4004	1N4001	R	300	0.6	150M	20*					
1N861	S	1N4004	1N4001	R	400	0.6	150M	20*					
1N862	S	1N4005	1N4001	R	500	0.6	150M	20*					
1N863	S	1N4005	1N4001	R	600	0.6	150M	20*					
1N864	S	1N4006	1N4001	R	700	0.6	150M	20*					
1N865	S	1N4006	1N4001	R	800	0.6	150M	20*					
1N866	S	1N4007	1N4001	R	900	0.6	150M	20*					
1N867	S	1N4007	1N4001	R	1.0K	0.6	150M	20*					
1N868	S	1N4001	1N4001	R	50	0.6	100M	20*					
1N869	S	1N4002	1N4001	R	100	0.6	100M	20*					
1N870	S	1N4003	1N4001	R	200	0.6	100M	20*					
1N871	S	1N4004	1N4001	R	300	0.6	100M	20*					
1N872	S	1N4004	1N4001	R	400	0.6	100M	20*					
1N873	S	1N4005	1N4001	R	500	0.6	100M	20*					
1N874	S	1N4005	1N4001	R	600	0.6	100M	20*					
1N875	S	1N4006	1N4001	R	700	0.6	100M	20*					
1N876	S	1N4006	1N4001	R	800	0.6	100M	20*					
1N877	S	1N4007	1N4001	R	900	0.6	100M	20*					
1N878	S	1N4007	1N4001	R	1.0K	0.6	100M	20*					
1N879	S	1N4001	1N4001	R	50	0.6	50M	20*					
1N880	S	1N4002	1N4001	R	100	0.6	50M	20*					
1N881	S	1N4003	1N4001	R	200	0.6	50M	20*					
1N882	S	1N4004	1N4001	R	300	0.6	50M	20*					
1N883	S	1N4004	1N4001	R	400	0.6	50M	20*					
1N884	S	1N4005	1N4001	R	500	0.6	50M	20*					
1N885	S	1N4005	1N4001	R	600	0.6	50M	20*					
1N886	S	1N4006	1N4001	R	700	0.6	50M	20*					
1N887	S	1N4006	1N4001	R	800	0.6	50M	20*					
1N888	S	1N4007	1N4001	R	900	0.6	50M	20*					
1N889	S	1N4007	1N4001	R	1.0K	0.6	50M	20*					
1N890	S			DS	60	1.0	20M	25N					
1N891	S			DS		1.0	50M	0.1*	0.3				
1N892	S			DS		1.0	50M	0.1*	0.3				
1N893	S			DS		1.0	50M	0.1*	0.3				
1N894	G			DS	5.0								
1N895	G			DS	5.0								
1N896	G			DS	5.0								
1N897	S			DS	2.5	1.0	5.0M	0.1*	1.0				
1N898	S			DS	2.5	1.0	100M	5.0*	0.3				
1N899	S			DS	85	1.0	5.0M	0.1*	0.3				
1N900	S			DS	85	1.0	50M	0.1*	0.3				
1N901	S			DS	85	1.0	100M	0.5*	0.3				
1N902	S			DS	170	1.0	10M	1.0*	0.3				
1N903	S			DS	40	1.0	10M	0.1*	4.0				
1N903A	S			DS	40	1.0	20M	0.1*	4.0				
1N904	S			DS	30	1.0	10M	0.1*	4.0				
1N904A	S			DS	30	1.0	20M	0.1*	4.0				
1N905	S			DS	20	1.0	10M	0.1*	4.0				
1N905A	S			DS	20	1.0	20M	0.1*	4.0				
1N906	S			DS	20	1.0	10M	0.1*	4.0				
1N906A	S			DS	20	1.0	20M	0.1*	4.0				
1N907	S			DS	30	1.0	10M	0.1*	4.0				
1N907A	S			DS	30	1.0	20M	0.1*	4.0				
1N908	S			DS	40	1.0	10M	0.1*	4.0				
1N908A	S			DS	40	1.0	20M	0.1*	4.0				
1N909	G			DS	50	1.0	100M	10*					
1N910	G			DS	30	1.0	100M	10*					
1N911	G			DS	20	1.0	100M	10*					
1N912	S			DS	10	0.62	1.0M	1.0*					
1N912A	S			DS	10	0.62	1.0M	1.0*					
1N913	S			DS	10	0.62	1.0M	5.0*					
1N913A	S			DS	10	0.62	1.0M	1.0*					
1N914	S			DS	75	1.0	10M	5.0*	4.0				
1N914A	S			DS	75	1.0	20M	5.0*	4.0				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N914B	S	Microwave Ku-band Mixer		DS	75	1.0	100M	5.0*	4.0				
1N915	S			DS	50	1.0	50M	5.0*	10				
1N916	S			DS	75	1.0	10M	5.0*	4.0				
1N916A	S			DS	75	1.0	20M	5.0*	4.0				
1N916B	S			DS	75	1.0	30M	5.0*	4.0				
1N917	S			DS	30	1.0	10M	0.05*	3.0				
1N918	S			DS									
1N919	S			DS	150	1.0	100M	0.5*	0.3				
1N920	S			DS	36	1.0	500M	0.25*	0.3				
1N921	S			DS	70	1.0	500M	0.25*	0.3				
1N922	S			DS	100	1.0	500M	0.25*	0.3				
1N923	S			DS	130	1.0	500M	0.25*	0.3				
1N925	S			DS	32	1.0	5.0M	1.0*	0.15				
1N926	S			DS	32	1.0	5.0M	0.1*	0.15				
1N927	S			DS	52	1.0	10M	0.1*	0.15				
1N928	S			DS	96	1.0	10M	0.1*	0.15				
1N929	S			DS	20	1.0	20M	0.1*					
1N930	S			DS	50	1.0	20M	0.1*					
1N931	S			DS	100	1.0	20M	0.1*					
1N932	S			DS	200	1.0	20M	0.1*					
1N933	G			DS	100	1.0	14M	10*	0.4				
1N934	S			DS	60	1.0	30M	25N	1.0				
1N935	S		1N935	DR						9.0	0.01	7.5	0/75
1N935A	S		1N935	DR						9.0	0.01	7.5	-55/100
1N935B	S		1N935	DR						9.0	0.01	7.5	-55/150
1N936	S		1N935	DR						9.0	0.005	7.5	0/75
1N936A	S		1N935	DR						9.0	0.005	7.5	-55/100
1N936B	S		1N935	DR						9.0	0.005	7.5	-55/150
1N937	S		1N935	DR						9.0	0.002	7.5	0/75
1N937A	S		1N935	DR						9.0	0.002	7.5	-55/100
1N937B	S		1N935	DR						9.0	0.002	7.5	-55/150
1N938	S		1N935	DR						9.0	0.001	7.5	0/75
1N938A	S		1N935	DR						9.0	0.001	7.5	-55/100
1N938B	S		1N935	DR						9.0	0.001	7.5	-55/150
1N939	S		1N935	DR						9.0	0.0005	7.5	0/75
1N939A	S		1N935	DR						9.0	0.0005	7.5	-55/100
1N939B	S		1N935	DR						9.0	0.0005	7.5	-55/150
1N940	S			DR						9.0	0.0002	7.5	0/75
1N940A	S			DR						9.0	0.0002	7.5	-55/100
1N940B	S			DR						9.0	0.0002	7.5	-55/150
1N941	S		1N941	DR						11.7	0.01	7.5	0/75
1N941A	S		1N941	DR						11.7	0.01	7.5	-55/100
1N941B	S		1N941	DR						11.7	0.01	7.5	-55/150
1N942	S		1N941	DR						11.7	0.005	7.5	0/75
1N942A	S		1N941	DR						11.7	0.005	7.5	-55/100
1N942B	S		1N941	DR						11.7	0.005	7.5	-55/150
1N943	S		1N941	DR						11.7	0.002	7.5	0/75
1N943A	S		1N941	DR						11.7	0.002	7.5	-55/100
1N943B	S		1N941	DR						11.7	0.002	7.5	-55/150
1N944	S		1N941	DR						11.7	0.001	7.5	0/75
1N944A	S		1N941	DR						11.7	0.001	7.5	-55/100
1N944B	S		1N941	DR						11.7	0.001	7.5	-55/150
1N945	S		1N941	DR						11.7	0.0005	7.5	0/75
1N945A	S		1N941	DR						11.7	0.0005	7.5	-55/100
1N945B	S		1N941	DR						11.7	0.0005	7.5	-55/150
1N946	S			DR						11.7	0.0002	7.5	0/75
1N946A	S			DR						11.7	0.0002	7.5	-55/100
1N946B	S			DR						11.7	0.0002	7.5	-55/150
1N947	S			DS		1.0	400M	2.0*					
1N948	S			DS	36	1.5	100M	0.25*	1.0				
1N949	G			DS	50	0.39	10M	10*					
1N950													
thru													
1N956	S	Varactor Diodes, see Table on Page 1-100											
1N957	S		1N957	DZ						6.8	18.5	20	400M
1N957A	S		1N957	DZ						6.8	18.5	10	400M
1N957B	S		1N957	DZ						6.8	18.5	5.0	400M
1N958	S		1N957	DZ						7.5	16.5	20	400M
1N958A	S		1N957	DZ						7.5	16.5	10	400M
1N958B	S		1N957	DZ						7.5	16.5	5.0	400M
1N959	S		1N957	DZ						8.2	15	20	400M
1N959A	S		1N957	DZ						8.2	15	10	400M
1N959B	S		1N957	DZ						8.2	15	5.0	400M
1N960	S		1N957	DZ						9.1	14	20	400M
1N960A	S		1N957	DZ						9.1	14	10	400M
1N960B	S		1N957	DZ						9.1	14	5.0	400M
1N961	S		1N957	DZ						10	12.5	20	400M
1N961A	S		1N957	DZ						10	12.5	10	400M
1N961B	S		1N957	DZ						10	12.5	5.0	400M
1N962	S		1N957	DZ						11	11.5	20	400M
1N962A	S		1N957	DZ						11	11.5	10	400M
1N962B	S		1N957	DZ						11	11.5	5.0	400M



**1N963-1N990**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N963	S		1N957	DZ						12	10.5	20	400M
1N963A	S		1N957	DZ						12	10.5	10	400M
1N963B	S		1N957	DZ						12	10.5	5.0	400M
1N964	S		1N957	DZ						13	9.5	20	400M
1N964A	S		1N957	DZ						13	9.5	10	400M
1N964B	S		1N957	DZ						13	9.5	5.0	400M
1N965	S		1N957	DZ						15	8.5	20	400M
1N965A	S		1N957	DZ						15	8.5	10	400M
1N965B	S		1N957	DZ						15	8.5	5.0	400M
1N966	S		1N957	DZ						16	7.8	20	400M
1N966A	S		1N957	DZ						16	7.8	10	400M
1N966B	S		1N957	DZ						16	7.8	5.0	400M
1N967	S		1N957	DZ						18	7.0	20	400M
1N967A	S		1N957	DZ						18	7.0	10	400M
1N967B	S		1N957	DZ						18	7.0	5.0	400M
1N968	S		1N957	DZ						20	6.2	20	400M
1N968A	S		1N957	DZ						20	6.2	10	400M
1N968B	S		1N957	DZ						20	6.2	5.0	400M
1N969	S		1N957	DZ						22	5.6	20	400M
1N969A	S		1N957	DZ						22	5.6	10	400M
1N969B	S		1N957	DZ						22	5.6	5.0	400M
1N970	S		1N957	DZ						24	5.2	20	400M
1N970A	S		1N957	DZ						24	5.2	10	400M
1N970B	S		1N957	DZ						24	5.2	5.0	400M
1N971	S		1N957	DZ						27	4.6	20	400M
1N971A	S		1N957	DZ						27	4.6	10	400M
1N971B	S		1N957	DZ						27	4.6	5.0	400M
1N972	S		1N957	DZ						30	4.2	20	400M
1N972A	S		1N957	DZ						30	4.2	10	400M
1N972B	S		1N957	DZ						30	4.2	5.0	400M
1N973	S		1N957	DZ						33	3.8	20	400M
1N973A	S		1N957	DZ						33	3.8	10	400M
1N973B	S		1N957	DZ						33	3.8	5.0	400M
1N974	S		1N957	DZ						36	3.4	20	400M
1N974A	S		1N957	DZ						36	3.4	10	400M
1N974B	S		1N957	DZ						36	3.4	5.0	400M
1N975	S		1N957	DZ						39	3.2	20	400M
1N975A	S		1N957	DZ						39	3.2	10	400M
1N975B	S		1N957	DZ						39	3.2	5.0	400M
1N976	S		1N957	DZ						43	3.0	20	400M
1N976A	S		1N957	DZ						43	3.0	10	400M
1N976B	S		1N957	DZ						43	3.0	5.0	400M
1N977	S		1N957	DZ						47	2.7	20	400M
1N977A	S		1N957	DZ						47	2.7	10	400M
1N977B	S		1N957	DZ						47	2.7	5.0	400M
1N978	S		1N957	DZ						51	2.5	20	400M
1N978A	S		1N957	DZ						51	2.5	10	400M
1N978B	S		1N957	DZ						51	2.5	5.0	400M
1N979	S		1N957	DZ						56	2.2	20	400M
1N979A	S		1N957	DZ						56	2.2	10	400M
1N979B	S		1N957	DZ						56	2.2	5.0	400M
1N980	S		1N957	DZ						62	2.0	20	400M
1N980A	S		1N957	DZ						62	2.0	10	400M
1N980B	S		1N957	DZ						62	2.0	5.0	400M
1N981	S		1N957	DZ						68	1.8	20	400M
1N981A	S		1N957	DZ						68	1.8	10	400M
1N981B	S		1N957	DZ						68	1.8	5.0	400M
1N982	S		1N957	DZ						75	1.7	20	400M
1N982A	S		1N957	DZ						75	1.7	10	400M
1N982B	S		1N957	DZ						75	1.7	5.0	400M
1N983	S		1N957	DZ						82	1.5	20	400M
1N983A	S		1N957	DZ						82	1.5	10	400M
1N983B	S		1N957	DZ						82	1.5	5.0	400M
1N984	S		1N957	DZ						91	1.4	20	400M
1N984A	S		1N957	DZ						91	1.4	10	400M
1N984B	S		1N957	DZ						91	1.4	5.0	400M
1N985	S		1N957	DZ						100	1.3	20	400M
1N985A	S		1N957	DZ						100	1.3	10	400M
1N985B	S		1N957	DZ						100	1.3	5.0	400M
1N986	S		1N957	DZ						110	1.1	20	400M
1N986A	S		1N957	DZ						110	1.1	10	400M
1N986B	S		1N957	DZ						110	1.1	5.0	400M
1N987	S		1N957	DZ						120	1.0	20	400M
1N987A	S		1N957	DZ						120	1.0	10	400M
1N987B	S		1N957	DZ						120	1.0	5.0	400M
1N988	S		1N957	DZ						130	0.95	20	400M
1N988A	S		1N957	DZ						130	0.95	10	400M
1N988B	S		1N957	DZ						130	0.95	5.0	400M
1N989	S		1N957	DZ						150	0.85	20	400M
1N989A	S		1N957	DZ						150	0.85	10	400M
1N989B	S		1N957	DZ						150	0.85	5.0	400M
1N990	S		1N957	DZ						160	0.80	20	400M



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N990A	S		1N957	DZ						160	0.80	10	400M
1N990B	S		1N957	DZ						160	0.80	5.0	400M
1N991	S		1N957	DZ						180	0.68	20	400M
1N991A	S		1N957	DZ						180	0.68	10	400M
1N991B	S		1N957	DZ						180	0.68	5.0	400M
1N992	S		1N957	DZ						200	0.65	20	400M
1N992A	S		1N957	DZ						200	0.65	10	400M
1N992B	S		1N957	DZ						200	0.65	5.0	400M
1N993	S		DS	DS	20	1.2	10M	1.0*	4.0				
1N994	G		DS	DS	6.5	1.0	10M	30*	2.0				
1N995	G		DS	DS	15	0.5	10M	10*	6.0				
1N996	G		DS	DS	20	0.8	40M	15*	0.3				
1N997	S		DS	DS	35	1.0	10M	25N	0.15				
1N998	S		DS	DS	150	1.0	200M	1.0N					
1N999	S		DS	DS	100	1.0	50M	1.0N	4.0				
1N1005	G		R	R	380	0.15	0.25						
1N1007	G		R	R	380	0.3	0.35						
1N1008	S		R	R	380	0.3	0.4						
1N1013	G		R	R	380	0.15	0.25						
1N1016	G		R	R	380	0.15	0.4						
1N1021	G		R	R	380	0.15	0.25						
1N1022	G		R	R	380	0.15	0.3						
1N1023	G		R	R	380	0.15	0.35						
1N1024	G		R	R	380	0.15	0.4						
1N1028	S		R	R	50	1.5	0.25		15				
1N1029	S		R	R	100	1.5	0.25		15				
1N1030	S		R	R	150	1.5	0.25		15				
1N1031	S		R	R	200	1.5	0.25		15				
1N1032	S		R	R	300	1.5	0.25		15				
1N1033	S		R	R	400	1.5	0.25		15				
1N1034	S		R	R	50	1.5	0.5		15				
1N1035	S		R	R	100	1.5	0.5		15				
1N1036	S		R	R	150	1.5	0.5		15				
1N1037	S		R	R	200	1.5	0.5		15				
1N1038	S		R	R	300	1.5	0.5		15				
1N1039	S		R	R	400	1.5	0.5		15				
1N1040	S		R	R	50	1.5	0.5		15				
1N1041	S		R	R	100	1.5	0.5		15				
1N1042	S		R	R	150	1.5	0.5		15				
1N1043	S		R	R	200	1.5	0.5		15				
1N1044	S		R	R	300	1.5	0.5		15				
1N1045	S		R	R	400	1.5	0.5		15				
1N1046	S		R	R	50	1.5	0.5		15				
1N1047	S		R	R	100	1.5	0.5		15				
1N1048	S		R	R	150	1.5	0.5		15				
1N1049	S		R	R	200	1.5	0.5		15				
1N1050	S		R	R	300	1.5	0.5		15				
1N1051	S		R	R	400	1.5	0.5		15				
1N1052	S		R	R	50	1.5	0.5		20				
1N1053	S		R	R	100	1.5	0.5		20				
1N1054	S		R	R	150	1.5	0.5		20				
1N1055	S		R	R	200	1.5	0.5		20				
1N1056	S		R	R	300	1.5	0.5		20				
1N1057	S		R	R	400	1.5	0.5		20				
1N1058	S		R	R	50	1.5	1.5		20				
1N1059	S		R	R	100	1.5	1.5		20				
1N1060	S		R	R	150	1.5	1.5		20				
1N1061	S		R	R	200	1.5	1.5		20				
1N1062	S		R	R	300	1.5	1.5		20				
1N1063	S		R	R	400	1.5	1.5		20				
1N1064	S		R	R	50	1.5	1.5		20				
1N1065	S		R	R	100	1.5	1.5		20				
1N1066	S		R	R	150	1.5	1.5		20				
1N1067	S		R	R	200	1.5	1.5		20				
1N1068	S		R	R	300	1.5	1.5		20				
1N1069	S		R	R	400	1.5	1.5		20				
1N1070	S		R	R	50	1.5	1.5		20				
1N1071	S		R	R	100	1.5	1.5		20				
1N1072	S		R	R	150	1.5	1.5		20				
1N1073	S		R	R	200	1.5	1.5		20				
1N1074	S		R	R	300	1.5	1.5		20				
1N1075	S		R	R	400	1.5	1.5		20				
1N1076	S		R	R	50	1.5	5.0		50				
1N1077	S		R	R	100	1.5	5.0		50				
1N1078	S		R	R	150	1.5	5.0		50				
1N1079	S		R	R	200	1.5	5.0		50				
1N1080	S		R	R	300	1.5	5.0		50				
1N1081	S	1N4002	1N4001	R	100	1.5	0.25		15				
1N1082	S	1N4003	1N4001	R	200	1.5	0.25		15				
1N1083	S	1N4004	1N4001	R	300	1.5	0.25		15				
1N1084	S	1N4004	1N4001	R	400	1.5	0.25		15				
1N1085	S			R	100	1.5	0.6		24				



**1N1086-1N1176**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)		V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1086	S			R	200	1.5	0.6		24				
1N1087	S			R	300	1.5	0.6		24				
1N1088	S			R	400	1.5	0.6		24				
1N1089	S			R	100	1.5	2.0		24				
1N1090	S			R	200	1.5	2.0		24				
1N1091	S			R	300	1.5	2.0		24				
1N1092	S			R	400	1.5	2.0		24				
1N1093	G			DS	15	0.4	5.0M	25*	0.3				
1N1095	S	1N4005	1N4001	R	500	0.5	0.425	0.3	15				
1N1096	S	1N4005	1N4001	R	600	0.5	0.4	0.3	15				
1N1100	S	1N4002	1N4001	R	100	1.2	0.25	0.2	15				
1N1101	S	1N4003	1N4001	R	200	1.2	0.25	0.2	15				
1N1102	S	1N4004	1N4001	R	300	1.2	0.25	0.2	15				
1N1103	S	1N4004	1N4001	R	400	1.2	0.25	0.2	15				
1N1104	S	1N4005	1N4001	R	500	1.2	0.25	0.2	15				
1N1105	S	1N4005	1N4001	R	600	1.2	0.25	0.2	15				
1N1108	S			R	800	3.0	0.225		13.5				
1N1109	S			R	1200	4.5	0.212		12.7				
1N1110	S			R	1600	6.0	0.2		12				
1N1111	S			R	2000	7.5	0.187		11.2				
1N1112	S			R	2400	9.0	0.175		10.5				
1N1113	S			R	2800	10.5	0.162		9.7				
1N1115	S	MR1121 *	MR1120	R	100	0.65	0.6	0.4	15				
1N1116	S	MR1122 *	MR1120	R	200	0.65	0.6	0.3	15				
1N1117	S	MR1123 *	MR1120	R	300	0.65	0.6	0.3	15				
1N1118	S	MR1124 *	MR1120	R	400	0.65	0.6	0.3	15				
1N1119	S	MR1125 *	MR1120	R	500	0.65	0.6	0.3	15				
1N1120	S	MR1126 *	MR1120	R	600	0.65	0.6	0.3	15				
1N1124	S	*		R	200	1.1		0.3	25				
1N1124A	S	1N1124 *		R	200		3.3	0.3	25				
1N1125	S	*		R	300	1.1		0.3	25				
1N1125A	S	1N1125 *		R	300		3.3	0.3	25				
1N1126	S	*		R	400	1.1	1.0	0.3	25				
1N1126A	S	1N1126 *		R	400		3.3	0.3	25				
1N1127	S	*		R	500	1.1	1.0	0.3	25				
1N1127A	S	1N1126 *		R	500		3.3	0.3	25				
1N1128	S	*		R	600	1.1	1.0	0.3	25				
1N1128A	S	1N1126 *		R	600		3.3	0.3	25				
1N1130	S			R	1500	15	0.3	0.05					
1N1131	S			R	1500	15	0.3	0.05					
1N1132	S	Microwave S-X-band Mixer; NF = 9.5 dB											
1N1133	S			R	1500	15	0.085	0.025	3.5				
1N1134	S			R	1500	7.5	0.115	0.025	3.5				
1N1135	S			R	1800	18	0.075	0.025	3.5				
1N1136	S			R	1800	9.0	0.095	0.025	3.5				
1N1137	S			R	2400	24	0.057	0.025	3.5				
1N1138	S			R	2400	12	0.070	0.025	3.5				
1N1139	S			R	3600	27	0.075	0.025	3.5				
1N1140	S			R	3600	18	0.075	0.025	3.5				
1N1141	S			R	4800	36	0.070	0.025	3.5				
1N1142	S			R	4800	24	0.057	0.025	3.5				
1N1143	S			R	6000	45	0.057	0.025	3.5				
1N1143A	S			R	6000	30	0.075	0.025	3.5				
1N1144	S			R	7200	54	0.057	0.025	3.5				
1N1145	S			R	7200	36	0.070	0.025	3.5				
1N1146	S			R	8000	60	0.050	0.025	3.5				
1N1147	S			R	12K	60	0.050	0.025	3.5				
1N1148	S			R	14K	52	0.057	0.025	3.5				
1N1149	S			R	16K	60	0.050	0.025	3.5				
1N1150	S			R	1600		0.75		8.0				
1N1150A	S			R	1600	6.5	0.375	1.0	10				
1N1157	S			R	50		20		200				
1N1158	S			R	100		20						
1N1159	S			R	200		20						
1N1160	S			R	300		20						
1N1161	S			R	50		35		350				
1N1162	S			R	100		35		350				
1N1163	S			R	200		35		350				
1N1164	S			R	300		35		350				
1N1165	S			R	50		100		1000				
1N1166	S			R	100		100		1000				
1N1167	S			R	200		100		1000				
1N1168	S			R	300		100		1000				
1N1169	S	1N4004	1N4001	R			0.5						
1N1169A	S	1N4004	1N4001	R	400		0.5	3.5					
1N1170	G			DS	50	1.0	4.0M	5.0*					
1N1171	S			R	50		20						
1N1172	S			R	100		20						
1N1173	S			R	200		20						
1N1174	S			R	300		20						
1N1175	S			R	50		35		350				
1N1176	S			R	100		35		350				

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1177	S			R	200		35		350				
1N1178	S			R	300		35		350				
1N1179	S			R	50		100		1000				
1N1180	S			R	100		100		1000				
1N1181	S			R	200		100		1000				
1N1182	S			R	300		100		1000				
1N1183	S		1N1183	R	50	1.7	35	10	500				
1N1184	S		1N1183	R	100	1.7	35	10	500				
1N1185	S		1N1183	R	150	1.7	35	10	500				
1N1186	S		1N1183	R	200	1.7	35	10	500				
1N1187	S		1N1183	R	300	1.7	35	10	500				
1N1188	S		1N1183	R	400	1.7	35	10	500				
1N1189	S		1N1183	R	500	1.7	35	10	500				
1N1189A	S			R	500	1.2	40	2.0	800				
1N1190	S		1N1183	R	600	1.7	35	10	500				
1N1190A	S			R	600	1.2	40	1.8	800				
1N1191	S			R	50	2.35	18	5.0	220				
1N1191A	S			R	50	2.0	22	2.5	500				
1N1192	S			R	100	2.35	18	5.0	220				
1N1192A	S			R	100	2.0	22	2.5	500				
1N1193	S			R	150	2.35	18	5.0	220				
1N1193A	S			R	150	2.0	22	2.5	500				
1N1194	S			R	200	2.35	18	5.0	220				
1N1194A	S			R	200	2.0	22	2.5	500				
1N1195	S			R	300	2.35	18	5.0	220				
1N1195A	S			R	300	0.6	20	3.2	350				
1N1196	S			R	400	2.35	18	5.0	220				
1N1196A	S			R	400	0.6	20	2.5	350				
1N1197	S			R	500	2.35	18	5.0	220				
1N1197A	S			R	500	0.6	20	2.2	350				
1N1198	S			R	600	2.35	18	5.0	220				
1N1198A	S			R	600	0.6	20	1.5	350				
1N1199	S	1N1199 *		R	50		12	10					
1N1199A	S			R	50	1.35	12	3.0	240				
1N1199B	S			R	50	1.2	12	0.9	250				
1N1200	S	1N1200 *		R	100		12	10					
1N1200A	S			R	100	1.35	50	2.5	240				
1N1200B	S			R	100	1.2	12	0.9	250				
1N1201	S	1N1201 *		R	150		12	10					
1N1201A	S			R	150	1.35	50	2.25	240				
1N1201B	S			R	150	1.2	12	0.9	250				
1N1202	S	*		R	200		12	10					
1N1202A	S	1N1202 *		R	200	1.35	50	2.0	240				
1N1202B	S			R	200	1.2	12	0.9	250				
1N1203	S	*		R	300		12	10					
1N1203A	S	1N1203 *		R	300	1.35	50	1.75	240				
1N1203B	S			R	300	1.2	12	0.9	250				
1N1204	S	*		R	400		12	10					
1N1204A	S	1N1204 *		R	400	1.35	50	1.5	240				
1N1204B	S			R	400	1.2	12	0.9	250				
1N1205	S	*		R	500		12	10					
1N1205A	S	1N1205 *		R	500	1.35	50	1.25	240				
1N1205B	S			R	500	1.2	12	0.9	250				
1N1206	S	*		R	600		12	10					
1N1206A	S	1N1206 *		R	600	1.35	50	1.0	240				
1N1206B	S			R	600	1.2	12	0.9	250				
1N1217	S	1N4001	1N4001	R	50	1.0	1.6	1.5	20				
1N1217A	S	1N4001	1N4001	R	50	1.5	1.6	0.05					
1N1217B	S			R	50	1.7	1.35	0.3	25				
1N1218	S	1N4002	1N4001	R	100	1.0	1.6	1.5	20				
1N1218A	S	1N4002	1N4001	R	100	1.5	1.6	0.05					
1N1218B	S			R	100	1.7	1.35	0.3	25				
1N1219	S	1N4003	1N4001	R	150	1.0	1.6	1.5	20				
1N1219A	S	1N4003	1N4001	R	150	1.5	1.6	0.05					
1N1219B	S			R	150	1.7	1.35	0.3	25				
1N1220	S	1N4003	1N4001	R	200	1.0	1.6	1.5	20				
1N1220A	S	1N4003	1N4001	R	200	1.5	1.6	0.05					
1N1220B	S			R	200	1.7	1.35	0.3	25				
1N1221	S	1N4004	1N4001	R	300	1.0	1.6	1.5	20				
1N1221A	S	1N4004	1N4001	R	300	1.5	1.6	0.05					
1N1221B	S			R	300	1.7	1.35	0.3	25				
1N1222	S	1N4004	1N4001	R	400	1.0	1.6	1.5	20				
1N1222A	S	1N4004	1N4001	R	400	1.5	1.6	0.05					
1N1222B	S			R	400	1.7	1.35	0.3	25				
1N1223	S	1N4005	1N4001	R	500	1.0	1.6	1.5	20				
1N1223A	S	1N4005	1N4001	R	500	1.5	1.6	0.05					

Replacement \* denotes exact device type replacement available on request.



**1N1223B-1N1284**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1223B	S			R	500	1.7	1.35	0.3	25				
1N1224	S	1N4005	1N4001	R	600	1.0	1.6	1.5	20				
1N1224A	S	1N4005	1N4001	R	600	1.5	1.6	0.05					
1N1224B	S			R	600	1.62	1.25	0.3	25				
1N1225	S	1N4006	1N4001	R	700	1.0	1.6	1.5	20				
1N1225A	S	1N4006	1N4001	R	700	1.55	1.1	0.5	25				
1N1225B	S			R	700	1.62	1.25	0.3	25				
1N1226	S	1N4006	1N4001	R	800	1.0	1.6	1.5	20				
1N1226A	S	1N4006	1N4001	R	800	1.50	1.1	0.5	25				
1N1226B	S			R	800	1.58	1.15	0.3	25				
1N1227	S			R	50	1.0	1.6	1.5	20				
1N1227A	S	MR1120	MR1120	R	50	1.5	1.6	0.05					
1N1228	S			R	100	1.0	1.6	1.5	20				
1N1228A	S	MR1121	MR1120	R	100	1.5	1.6	0.05					
1N1229	S			R	150	1.0	1.6	1.5	20				
1N1229A	S	MR1122	MR1120	R	150	1.5	1.6	0.05					
1N1230	S			R	200	1.0	1.6	1.5	20				
1N1230A	S	MR1122	MR1120	R	200	1.5	1.6	0.05					
1N1231	S			R	300	1.0	1.6	1.5	20				
1N1231A	S	MR1123	MR1120	R	300	1.5	1.6	0.05					
1N1232	S			R	400	1.0	1.6	1.5	20				
1N1232A	S	MR1124	MR1120	R	400	1.5	1.6	0.05					
1N1233	S			R	500	1.0	1.6	1.5	20				
1N1233A	S	MR1125	MR1120	R	500	1.5	1.6	0.05					
1N1234	S			R	600	1.0	1.6	1.5	20				
1N1234A	S	MR1126	MR1120	R	600	1.5	1.6	0.05					
1N1235	S			R	700	1.0	1.6	1.5	20				
1N1236	S			R	800	1.0	1.6	1.5	20				
1N1237	S			R	1600		0.75		8.0				
1N1238	S			R	1600		0.75		8.0				
1N1239	S			R	2800		0.5		5.0				
1N1240	S			R	50	1.0	0.25	0.5	5.0				
1N1241	S			R	100	1.0	0.25	0.5	5.0				
1N1242	S			R	200	1.0	0.25	0.5	5.0				
1N1243	S			R	300	1.0	0.2	0.5	5.0				
1N1244	S			R	400	1.0	0.15	0.5					
1N1244A	S			R	400	1.0	0.2	0.5	5.0				
1N1245	S			R	500	1.0	0.13	0.4					
1N1246	S			R	600	1.0	0.115	0.3					
1N1247	S			R	700	1.0	0.1	0.2					
1N1248	S			R	800	1.0	0.08	0.1					
1N1249	S			R	900	1.0	0.065	0.1					
1N1250	S			R	1000	1.0	0.05	0.1					
1N1251	S	1N4001	1N4001	R	50	1.0	0.25	0.5	5.0				
1N1252	S	1N4002	1N4001	R	100	1.0	0.25	0.5	5.0				
1N1253	S	1N4003	1N4001	R	200	1.0	0.25	0.5	5.0				
1N1254	S	1N4004	1N4001	R	300	1.0	0.2	0.5	5.0				
1N1255	S	1N4004	1N4001	R	400	1.0	0.15	0.5					
1N1255A	S			R	400	1.0	0.2	0.5	5.0				
1N1256	S			R	500	1.0	0.13	0.4					
1N1257	S			R	600	1.0	0.115	0.3					
1N1258	S			R	700	1.0	0.1	0.2					
1N1259	S			R	800	1.0	0.08	0.1					
1N1260	S			R	900	1.0	0.065	0.1					
1N1261	S			R	1000	1.0	0.05	0.1					
1N1262	S			R	4500		0.25		2.5				
1N1263	S			R	50		150		1500				
1N1263A	S			R	50		200		2000				
1N1264	S			R	100		150		1500				
1N1264A	S			R	100		200		2000				
1N1265	S			R	200		150		1500				
1N1265A	S			R	200		200		2000				
1N1266	S			R	300		150		1500				
1N1266A	S			R	300		200		2000				
1N1267	S			R	50		150		1500				
1N1267A	S			R	50		200		2000				
1N1268	S			R	100		150		1500				
1N1268A	S			R	100		200		2000				
1N1269	S			R	200		150		1500				
1N1269A	S			R	200		200		2000				
1N1270	S			R	300		150		1500				
1N1270A	S			R	300		200		2000				
1N1271	S			R	50		160	40					
1N1272	S			R	100		160	40					
1N1273	S			R	150		160	40					
1N1274	S			R	200		160	40					
1N1275	S			R	300		160	40					
1N1276	S			R	400		160	40					
1N1277	S			R	500		160	40					
1N1281	S			R	50		160	40					
1N1282	S			R	100		160	40					
1N1283	S			R	150		160	40					
1N1284	S			R	200		160	40					



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1285	S			R	300		160	40					
1N1286	S			R	400		160	40					
1N1287	S			R	500		160	40					
1N1291	S			R	50		160	40					
1N1292	S			R	100		160	40					
1N1293	S			R	150		160	40					
1N1294	S			R	200		160	40					
1N1295	S			R	300		160	40					
1N1296	S			R	400		160	40					
1N1297	S			R	500		160	40					
1N1301	S			R	50	0.63	17.5	15	300				
1N1302	S			R	100	0.63	17.5	5.0	300				
1N1304	S			R	200	0.63	17.5	5.0	300				
1N1306	S			R	300	0.63	17.5	5.0	300				
1N1313	S	MZ92-8.8A	MZ92-2.4,A,B							8.8	0.2	10	150M
1N1313A	S	MZ92-8.8B	MZ92-2.4,A,B							8.8	0.2	5.0	150M
1N1314	S	MZ92-10.5A	MZ92-2.4,A,B							10.5	0.2	10	150M
1N1314A	S	MZ92-10.5B	MZ92-2.4,A,B							10.5	0.2	5.0	150M
1N1315	S	MZ92-12.8A	MZ92-2.4,A,B							12.8	0.2	10	150M
1N1315A	S	MZ92-12.8B	MZ92-2.4,A,B							12.8	0.2	5.0	150M
1N1316	S	MZ92-15.8A	MZ92-2.4,A,B							15.8	0.2	10	150M
1N1316A	S	MZ92-15.8B	MZ92-2.4,A,B							15.8	0.2	5.0	150M
1N1317	S	MZ92-19A	MZ92-2.4,A,B							19	0.2	10	150M
1N1317A	S	MZ92-19B	MZ92-2.4,A,B							19	0.2	5.0	150M
1N1318	S	MZ92-23.5A	MZ92-2.4,A,B							23	0.2	10	150M
1N1318A	S	MZ92-23.5B	MZ92-2.4,A,B							23	0.2	5.0	150M
1N1319	S	MZ92-28.5A	MZ92-2.4,A,B							28	0.2	10	150M
1N1319A	S	MZ92-28.5B	MZ92-2.4,A,B							28	0.2	5.0	150M
1N1320	S	MZ92-34.5A	MZ92-2.4,A,B							34.5	0.2	10	150M
1N1320A	S	MZ92-34.5B	MZ92-2.4,A,B							34.5	0.2	5.0	150M
1N1321	S	MZ92-41A	MZ92-2.4,A,B							41	0.2	10	150M
1N1321A	S	MZ92-41B	MZ92-2.4,A,B							41	0.2	5.0	150M
1N1322	S	MZ92-48.5A	MZ92-2.4,A,B							48.5	0.2	10	150M
1N1322A	S	MZ92-48.5B	MZ92-2.4,A,B							48.5	0.2	5.0	150M
1N1323	S	MZ92-58A	MZ92-2.4,A,B							58	0.2	10	150M
1N1323A	S	MZ92-58B	MZ92-2.4,A,B							58	0.2	5.0	150M
1N1324	S	MZ92-71A	MZ92-2.4,A,B							71	0.2	10	150M
1N1325	S	MZ92-87.5A	MZ92-2.4,A,B							89.5	0.2	10	150M
1N1326	S	MZ92-105A	MZ92-2.4,A,B							105	0.2	10	150M
1N1327	S	MZ92-127.5A	MZ92-2.4,A,B							127	0.2	10	150M
1N1329	S			R	1500	1.3	0.1	0.02	2.0				
1N1330	S			R	50		240	50					
1N1331	S			R	100		240	50					
1N1332	S			R	150		240	50					
1N1333	S			R	200		240	50					
1N1334	S			R	300		240	50					
1N1335	S			R	400		240	50					
1N1336	S			R	500		240	50					
1N1341	S	*		R	50	1.6	6.0	4.0	150				
1N1341A	S	MR1120*	MR1120	R	50	1.4	6.0	3.0	150				
1N1341B	S			R	50	1.2	6.0	0.45	160				
1N1342	S	*		R	100	1.6	6.0	4.0	150				
1N1342A	S	MR1121*	MR1120	R	100	1.4	6.0	2.5	150				
1N1342B	S			R	100	1.2	6.0	0.45	160				
1N1343	S	*		R	150	1.6	6.0	4.0	150				
1N1343A	S	MR1122*	MR1120	R	150	1.4	6.0	2.25	150				
1N1343B	S			R	150	1.2	6.0	0.45	160				
1N1344	S	*		R	200	1.6	6.0	4.0	150				
1N1344A	S	MR1122*	MR1120	R	200	1.4	6.0	2.0	150				
1N1344B	S			R	200	1.2	6.0	0.45	160				
1N1345	S	*		R	300	1.6	6.0	4.0	150				
1N1345A	S	MR1123*	MR1120	R	300	1.4	6.0	1.75	150				
1N1345B	S			R	300	1.2	6.0	0.45	160				
1N1346	S	*		R	400	1.6	6.0	4.0	150				
1N1346A	S	MR1124*	MR1120	R	400	1.4	6.0	1.5	150				
1N1346B	S			R	400	1.2	6.0	0.45	160				
1N1347	S	*		R	500	1.6	6.0	4.0	150				
1N1347A	S	MR1125*	MR1120	R	500	1.4	6.0	1.25	150				
1N1347B	S			R	500	1.2	6.0	0.45	160				
1N1348	S	*		R	600	1.6	6.0	4.0	150				
1N1348A	S	MR1126*	MR1120	R	600	1.4	6.0	1.0	150				
1N1348B	S			R	600	1.2	6.0	0.45	160				
1N1351	S	1N2974A *	1N2970	DZ						10	500	10	10W
1N1351A	S	1N2974B *	1N2970	DZ						10	500	5.0	10W
1N1352	S	1N2975A *	1N2970	DZ						11	500	10	10W
1N1352A	S	1N2975B *	1N2970	DZ						11	500	5.0	10W
1N1353	S	1N2976A *	1N2970	DZ						12	500	10	10W
1N1353A	S	1N2976B *	1N2970	DZ						12	500	5.0	10W
1N1354	S	1N2977A *	1N2970	DZ						13	500	10	10W
1N1354A	S	1N2977B *	1N2970	DZ						13	500	5.0	10W
1N1355	S	1N2979A *	1N2970	DZ						15	500	10	10W
1N1355A	S	1N2979B *	1N2970	DZ						15	500	5.0	10W

Replacement \* denotes exact device type replacement available on request.



**1N1356-1N1432**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1356	S	1N2980A *	1N2970	DZ						16	500	10	10W
1N1356A	S	1N2980B *	1N2970	DZ						16	500	5.0	10W
1N1357	S	1N2982A *	1N2970	DZ						18	150	10	10W
1N1357A	S	1N2982B *	1N2970	DZ						18	150	5.0	10W
1N1358	S	1N2984A *	1N2970	DZ						20	150	10	10W
1N1358A	S	1N2984B *	1N2970	DZ						20	150	5.0	10W
1N1359	S	1N2985A *	1N2970	DZ						22	150	10	10W
1N1359A	S	1N2985B *	1N2970	DZ						22	150	5.0	10W
1N1360	S	1N2986A *	1N2970	DZ						24	150	10	10W
1N1360A	S	1N2986B *	1N2970	DZ						24	150	5.0	10W
1N1361	S	1N2988A *	1N2970	DZ						27	150	10	10W
1N1361A	S	1N2988B *	1N2970	DZ						27	150	5.0	10W
1N1362	S	1N2989A *	1N2970	DZ						30	150	10	10W
1N1362A	S	1N2989B *	1N2970	DZ						30	150	5.0	10W
1N1363	S	1N2990A *	1N2970	DZ						33	150	10	10W
1N1363A	S	1N2990B *	1N2970	DZ						33	150	5.0	10W
1N1364	S	1N2991A *	1N2970	DZ						36	150	10	10W
1N1364A	S	1N2991B *	1N2970	DZ						36	150	5.0	10W
1N1365	S	1N2992A *	1N2970	DZ						39	150	10	10W
1N1365A	S	1N2992B *	1N2970	DZ						39	150	5.0	10W
1N1366	S	1N2993A *	1N2970	DZ						43	150	10	10W
1N1366A	S	1N2993B *	1N2970	DZ						43	150	5.0	10W
1N1367	S	1N2995A *	1N2970	DZ						47	150	10	10W
1N1367A	S	1N2995B *	1N2970	DZ						47	150	5.0	10W
1N1368	S	1N2997A *	1N2970	DZ						51	150	10	10W
1N1368A	S	1N2997B *	1N2970	DZ						51	150	5.0	10W
1N1369	S	1N2999A *	1N2970	DZ						56	150	10	10W
1N1369A	S	1N2999B *	1N2970	DZ						56	150	5.0	10W
1N1370	S	1N3000A *	1N2970	DZ						62	50	10	10W
1N1370A	S	1N3000B *	1N2970	DZ						62	50	5.0	10W
1N1371	S	1N3001A *	1N2970	DZ						68	50	10	10W
1N1371A	S	1N3001B *	1N2970	DZ						68	50	5.0	10W
1N1372	S	1N3002A *	1N2970	DZ						75	50	10	10W
1N1372A	S	1N3002B *	1N2970	DZ						75	50	5.0	10W
1N1373	S	1N3003A *	1N2970	DZ						82	50	10	10W
1N1373A	S	1N3003B *	1N2970	DZ						82	50	5.0	10W
1N1374	S	1N3004A *	1N2970	DZ						91	50	10	10W
1N1374A	S	1N3004B *	1N2970	DZ						91	50	5.0	10W
1N1375	S	1N3005A *	1N2970	DZ						100	50	10	10W
1N1375A	S	1N3005B *	1N2970	DZ						100	50	5.0	10W
1N1376	S			R	50		240	50					
1N1377	S			R	100		240	50					
1N1378	S			R	150		240	50					
1N1379	S			R	200		240	50					
1N1380	S			R	300		240	50					
1N1381	S			R	400		240	50					
1N1382	S			R	500		240	50					
1N1396	S	MR1810SB	MR1210	R	50	1.55	70	15	1200				
1N1397	S	MR1811SB	MR1210	R	100	1.55	70	15	1200				
1N1398	S	MR1812SB	MR1210	R	150	1.55	70	15	1200				
1N1399	S	MR1813SB	MR1210	R	200	1.55	70	15	1200				
1N1400	S	MR1815SB	MR1210	R	300	1.55	70	15	1200				
1N1401	S	MR1817SB	MR1210	R	400	1.55	70	15	1200				
1N1402	S	MR1818SB	MR1210	R	500	1.55	70	15	1200				
1N1403	S	MR1819SB	MR1210	R	600	1.55	70	15	1200				
1N1406	S	1N4005	1N4001	R	600	5.0	0.1	0.1	3.5				
1N1407	S	1N4006	1N4001	R	800	5.0	1.0	0.1	3.5				
1N1408	S	1N4007	1N4001	R	1000	5.0	1.0	0.1	3.5				
1N1409	S	MR991A	MR990A	R	1200	5.0	0.1	0.1	3.5				
1N1410	S	MR991A	MR990A	R	1500	6.25	0.1	0.1	3.5				
1N1411	S	MR992A	MR990A	R	1800	7.5	0.1	0.1	3.5				
1N1412	S	MR992A	MR990A	R	2000	6.25	0.1	0.1	3.5				
1N1413	S	MR993A	MR990A	R	2400	7.5	0.1	0.1	3.5				
1N1414	S			R	400	1.25	10	1.0	100				
1N1415	S			DS		1.1	1.0	1.0*					
1N1416	S	1N2972B	1N2970	DZ						8.2	200	5.0	10W
1N1417	S	1N2976B	1N2970	DZ						12	200	5.0	10W
1N1418	S	1N2979B	1N2970	DZ						15	100	5.0	10W
1N1419	S	1N2982B	1N2970	DZ						18	100	5.0	10W
1N1420	S	1N2985B	1N2970	DZ						22	100	5.0	10W
1N1421	S	1N2988B	1N2970	DZ						27	50	5.0	10W
1N1422	S	1N3001B	1N2970	DZ						68	20	5.0	10W
1N1423	S	1N3005B	1N2970	DZ						150	20	5.0	10W
1N1424	S	1N3011B	1N2970	DZ						150	10	5.0	10W
1N1425	S	1N4738A	1N2970	DZ						8.2	20	5.0	1.0W
1N1426	S	1N4742A	1N2970	DZ						12	20	5.0	1.0W
1N1427	S	1N4744A	1N2970	DZ						15	10	5.0	1.0W
1N1428	S	1N4746A	1N2970	DZ						18	10	5.0	1.0W
1N1429	S	1N4748A	1N2970	DZ						22	10	5.0	1.0W
1N1430	S	1N4750A	1N2070	DZ						27	5.0	5.0	1.0W
1N1431	S	1N4760A	1N2070	DZ						68	2.0	5.0	1.0W
1N1432	S	1N4764A	1N2070	DZ						100	2.0	5.0	1.0W

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1433	S	1M150ZS5		DZ						150	1.0	5.0	10W
1N1434	S	1N1183	1N1183	R	50	1.2	30	5.0					
1N1435	S	1N1184	1N1183	R	100	1.2	30	5.0					
1N1436	S	1N1186	1N1183	R	200	1.2	30	5.0					
1N1437	S	1N1188	1N1183	R	400	1.2	30	5.0					
1N1438	S	1N1190	1N1183	R	600	1.2	30	5.0					
1N1440	S			R	200	1.2	0.75	0.5	30				
1N1441	S			R	300	1.2	0.75	0.5	30				
1N1442	S			R	400	1.2	0.75	0.5	30				
1N1443	S	1N4007	1N4001	R	1000	1.0	1.6	1.5	20				
1N1443A	S			R	1000	1.45	1.1	0.5	25				
1N1443B	S			R	1000	1.55	1.1	0.3	25				
1N1444	S	MR1130	MR1120	R	1000	1.0	1.6	1.5	20				
1N1445	S			R	360	2.0	0.2	4.0					
1N1446	S			R	100	2.0		2.0					
1N1447	S			R	200	2.0		2.0					
1N1448	S			R	300	1.4		2.0					
1N1449	S			R	400	2.0		2.0					
1N1450	S			R	100	1.4		5.0					
1N1451	S			R	200	1.4		5.0					
1N1452	S			R	300	1.4		5.0					
1N1453	S			R	400	1.4		5.0					
1N1454	S			R	100	1.5	25	25					
1N1455	S			R	200	1.5	25	25					
1N1456	S			R	300	1.5	25	25					
1N1457	S			R	400	1.5	25	25					
1N1458	S			R	100	1.5	35	25					
1N1459	S			R	200	1.5	35	25					
1N1460	S			R	300	1.5	35	25					
1N1461	S			R	400	1.5	35	25					
1N1462	S			R	100	1.5	50	50					
1N1463	S			R	200	1.5	50	50					
1N1464	S			R	300	1.5	50	50					
1N1465	S			R	400	1.5	50	50					
1N1466	S	MR1221FB	MR1220	R	100	1.5	75	50					
1N1467	S	MR1223FB	MR1220	R	200	1.5	75	50					
1N1468	S	MR1225FB	MR1220	R	300	1.5	75	50					
1N1469	S	MR1227FB	MR1220	R	400	1.5	75	50					
1N1470	S			R	100	1.5	100	100					
1N1471	S			R	200	1.5	100	100					
1N1472	S			R	300	1.5	100	100					
1N1473	S			R	400	1.5	100	100					
1N1474	S			R	100	1.5	150	100					
1N1475	S			R	200	1.5	150	100					
1N1476	S			R	300	1.5	150	100					
1N1477	S			R	400	1.5	150	100					
1N1478	S	MR1241FB	MR1240	R	100	1.5	200	100					
1N1479	S	MR1243FB	MR1240	R	200	1.5	200	100					
1N1480	S	MR1245FB	MR1240	R	300	1.5	200	100					
1N1481	S	MR1247FB	MR1240	R	400	1.5	200	100					
1N1482	S	1N3995A	1N3993	DZ						4.7	200	5.0	10W
1N1483	S	1N3998A	1N3993	DZ						6.2	200	5.0	10W
1N1484	S	1N4732A	1N4728	DZ						4.7	50	5.0	1.0W
1N1485	S	1N4735A	1N4728	DZ						6.2	20	5.0	1.0W
1N1486	S	1N4005	1N4001	R	500		0.5	3.5					
1N1487	S	1N4002	1N4001	R	100	0.55	0.25	0.4	15				
1N1488	S	1N4003	1N4001	R	200	0.55	0.25	0.3	15				
1N1489	S	1N4004	1N4001	R	300	0.55	0.25	0.3	15				
1N1490	S	1N4004	1N4001	R	400	0.55	0.25	0.3	15				
1N1491	S	1N4005	1N4001	R	500	0.55		0.3	15				
1N1492	S	1N4005	1N4001	R	600	0.55		0.3	15				
1N1507	S	1N4730 *	1N4728	DZ						3.9	35	10	750M
1N1507A	S	1N4730A *	1N4728	DZ						3.9	35	5.0	750M
1N1508	S	1N4732 *	1N4728	DZ						4.7	30	10	750M
1N1508A	S	1N4732A *	1N4728	DZ						4.7	30	5.0	750M
1N1509	S	1N4734 *	1N4728	DZ						5.6	25	10	750M
1N1509A	S	1N4734A *	1N4728	DZ						5.6	25	5.0	750M
1N1510	S	1N4736 *	1N4728	DZ						6.8	22	10	750M
1N1510A	S	1N4736A *	1N4728	DZ						6.8	22	5.0	750M
1N1511	S	1N4738 *	1N4728	DZ						8.2	18	10	750M
1N1511A	S	1N4738A *	1N4728	DZ						8.2	18	5.0	750M
1N1512	S	1N4740 *	1N4728	DZ						10	15	10	750M
1N1512A	S	1N4740A *	1N4728	DZ						10	15	5.0	750M
1N1513	S	1N4742 *	1N4728	DZ						12	12	10	750M
1N1513A	S	1N4742A *	1N4728	DZ						12	12	5.0	750M
1N1514	S	1N4744 *	1N4728	DZ						15	10	10	750M
1N1514A	S	1N4744A *	1N4728	DZ						15	10	5.0	750M
1N1515	S	1N4746 *	1N4728	DZ						18	8.0	10	750M
1N1515A	S	1N4746A *	1N4728	DZ						18	8.0	5.0	750M
1N1516	S	1N4748 *	1N4728	DZ						22	6.0	10	750M
1N1516A	S	1N4748A *	1N4728	DZ						22	6.0	5.0	750M
1N1517	S	1N4750 *	1N4728	DZ						27	5.0	10	750M

Replacement \* denotes exact device type replacement available on request.



**1N1517A-1N1590A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES				REFERENCE DIODES				
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)	I <sub>R</sub>	t <sub>rr</sub> (μs)		V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1517A	S	1N4750A *	1N4728	DZ						27	5.0	5.0	750M
1N1518	S	1N4730 *	1N4728	DZ						3.9	50	10	1.0W
1N1518A	S	1N4730A *	1N4728	DZ						3.9	50	5.0	1.0W
1N1519	S	1N4732 *	1N4728	DZ						4.7	40	10	1.0W
1N1519A	S	1N4732A *	1N4728	DZ						4.7	40	5.0	1.0W
1N1520	S	1N4734 *	1N4728	DZ						5.6	35	10	1.0W
1N1520A	S	1N4734A *	1N4728	DZ						5.6	35	5.0	1.0W
1N1521	S	1N4736 *	1N4728	DZ						6.8	30	10	1.0W
1N1521A	S	1N4736A *	1N4728	DZ						6.8	30	5.0	1.0W
1N1522	S	1N4738 *	1N4728	DZ						8.2	25	10	1.0W
1N1522A	S	1N4738A *	1N4728	DZ						8.2	25	5.0	1.0W
1N1523	S	1N4740 *	1N4728	DZ						10	20	10	1.0W
1N1523A	S	1N4740A *	1N4728	DZ						10	20	5.0	1.0W
1N1524	S	1N4742 *	1N4728	DZ						12	15	10	1.0W
1N1524A	S	1N4742A *	1N4728	DZ						12	15	5.0	1.0W
1N1525	S	1N4744 *	1N4728	DZ						15	13	10	1.0W
1N1525A	S	1N4744A *	1N4728	DZ						15	13	5.0	1.0W
1N1526	S	1N4746 *	1N4728	DZ						18	10	10	1.0W
1N1526A	S	1N4746A *	1N4728	DZ						18	10	5.0	1.0W
1N1527	S	1N4748 *	1N4728	DZ						22	9.0	10	1.0W
1N1527A	S	1N4748A *	1N4728	DZ						22	9.0	5.0	1.0W
1N1528	S	1N4750 *	1N4728	DZ						27	7.0	10	1.0W
1N1528A	S	1N4750A *	1N4728	DZ						27	7.0	5.0	1.0W
1N1530	S	1N3156 *	1N3154	DR						8.4	0.002	10	-55/100
1N1530A	S	1N3157 *	1N3154	DR						8.4	0.002	10	-55/100
1N1537	S	MR1120 *	MR1120	R	50	1.5	1.6	0.05					
1N1538	S	MR1121 *	MR1120	R	100	1.5	1.6	0.05					
1N1539	S	MR1122 *	MR1120	R	150	1.5	1.6	0.05					
1N1540	S	MR1122 *	MR1120	R	200	1.5	1.6	0.05					
1N1541	S	MR1123 *	MR1120	R	300	1.5	1.6	0.05					
1N1542	S	MR1124 *	MR1120	R	400	1.5	1.6	0.05					
1N1543	S	MR1125 *	MR1120	R	500	1.5	1.6	0.05					
1N1544	S	MR1126 *	MR1120	R	600	1.5	1.6	0.05					
1N1551	S	MR1121	MR1120	R	100	1.4		1.0					
1N1552	S	MR1122	MR1120	R	200	1.4		1.0					
1N1553	S	MR1123	MR1120	R	300	1.4		1.0					
1N1554	S	MR1124	MR1120	R	400	1.4		1.0					
1N1555	S	MR1125	MR1120	R	500	1.4		1.0					
1N1556	S			R	100	1.4		1.0					
1N1557	S			R	200	1.4		1.0					
1N1558	S			R	300	1.4		1.0					
1N1559	S			R	400	1.4		1.0					
1N1560	S			R	500	1.4		1.0					
1N1561	G			DS	25	0.4	12M	25*					
1N1562	G			DS	25	0.4	8.0M	25*					
1N1563	S			R	100	1.5	1.0	0.003	70				
1N1563A	S			R	100	1.5	1.5	0.003	70				
1N1564	S			R	200	1.5	1.0	0.003	70				
1N1564A	S			R	200	1.5	1.5	0.003	70				
1N1565	S			R	300	1.5	1.0	0.003	70				
1N1565A	S			R	300	1.5	1.5	0.003	70				
1N1566	S			R	400	1.5	1.0	0.003	70				
1N1566A	S			R	400	1.5	1.5	0.003	70				
1N1567	S			R	500	1.2	1.0	0.005	70				
1N1567A	S			R	500	1.5	1.5	0.003	70				
1N1568	S			R	600	1.2	1.0	0.005	70				
1N1568A	S			R	600	1.5	1.5	0.003	70				
1N1569	S			R	100	1.5	1.0	0.005	70				
1N1570	S			R	200	1.5	1.0	0.005	70				
1N1571	S			R	300	1.5	1.0	0.005	70				
1N1572	S			R	400	1.5	1.0	0.005	70				
1N1573	S			R	500	1.5	1.0	0.005	70				
1N1574	S			R	600	1.5	1.0	0.005	70				
1N1575	S			R	100	1.5	3.5	0.005	70				
1N1576	S			R	200	1.5	3.5	0.005	70				
1N1577	S			R	300	1.5	3.5	0.005	70				
1N1578	S			R	400	1.5	3.5	0.005	70				
1N1579	S			R	500	1.5	3.5	0.005	70				
1N1580	S			R	600	1.5	3.5	0.005	70				
1N1581	S	MR1120	MR1120	R	50	1.5	3.0	5.0	40				
1N1582	S	MR1121	MR1120	R	100	1.5	3.0	5.0	40				
1N1583	S	MR1122	MR1120	R	200	1.5	3.0	5.0	40				
1N1584	S	MR1123	MR1120	R	300	1.5	3.0	5.0	40				
1N1585	S	MR1124	MR1120	R	400	1.5	3.0	5.0	40				
1N1586	S	MR1125	MR1120	R	500	1.5	3.0	5.0	40				
1N1587	S	MR1126	MR1120	R	600	1.5	3.0	5.0	40				
1N1588	S	1N3993 *	1N3993	DZ						3.9	150	10	3.5W
1N1588A	S	1N3993A *	1N3993	DZ						3.9	150	5.0	3.5W
1N1589	S	1N3995 *	1N3993	DZ						4.7	125	10	3.5W
1N1589A	S	1N3995A *	1N3993	DZ						4.7	125	5.0	3.5W
1N1590	S	1N3997 *	1N3993	DZ						5.6	110	10	3.5W
1N1590A	S	1N3997A *	1N3993	DZ						5.6	110	5.0	3.5W

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>r</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1591	S	1N2970RA *	1N2970	DZ						6.8	100	10	3.5W
1N1591A	S	1N2970RB *	1N2970	DZ						6.8	100	5.0	3.5W
1N1592	S	1N2972RA *	1N2970	DZ						8.2	80	10	3.5W
1N1592A	S	1N2972RB *	1N2970	DZ						8.2	80	5.0	3.5W
1N1593	S	1N2974RA *	1N2970	DZ						10	70	10	3.5W
1N1593A	S	1N2974RB *	1N2970	DZ						10	70	5.0	3.5W
1N1594	S	1N2976RA *	1N2970	DZ						12	50	10	3.5W
1N1594A	S	1N2976RB *	1N2970	DZ						12	50	5.0	3.5W
1N1595	S	1N2979RA *	1N2970	DZ						15	40	10	3.5W
1N1595A	S	1N2979RB *	1N2970	DZ						15	40	5.0	3.5W
1N1596	S	1N2982RA *	1N2970	DZ						18	35	10	3.5W
1N1596A	S	1N2982RB *	1N2970	DZ						18	35	5.0	3.5W
1N1597	S	1N2985RA *	1N2970	DZ						22	30	10	3.5W
1N1597A	S	1N2985RB *	1N2970	DZ						22	30	5.0	3.5W
1N1598	S	1N2988RA *	1N2970	DZ						27	25	10	3.5W
1N1598A	S	1N2988RB *	1N2970	DZ						27	25	5.0	3.5W
1N1599	S	1N3993 *	1N3993	DZ						3.9	500	10	10W
1N1599A	S	1N3993A *	1N3993	DZ						3.9	500	5.0	10W
1N1600	S	1N3995 *	1N3993	DZ						4.7	400	10	10W
1N1600A	S	1N3995A *	1N3993	DZ						4.7	400	5.0	10W
1N1601	S	1N3997 *	1N3993	DZ						5.6	350	10	10W
1N1601A	S	1N3997A *	1N3993	DZ						5.6	350	5.0	10W
1N1602	S	1N2970RA *	1N2970	DZ						6.8	300	10	10W
1N1602A	S	1N2970RB *	1N2970	DZ						6.8	300	5.0	10W
1N1603	S	1N2972RA *	1N2970	DZ						8.2	250	10	10W
1N1603A	S	1N2972RB *	1N2970	DZ						8.2	250	5.0	10W
1N1604	S	1N2974RA *	1N2970	DZ						10	200	10	10W
1N1604A	S	1N2974RB *	1N2970	DZ						10	200	5.0	10W
1N1605	S	1N2976RA *	1N2970	DZ						12	170	10	10W
1N1605A	S	1N2976RB *	1N2970	DZ						12	170	5.0	10W
1N1606	S	1N2979RA *	1N2970	DZ						15	140	10	10W
1N1606A	S	1N2979RB *	1N2970	DZ						15	140	5.0	10W
1N1607	S	1N2982RA *	1N2970	DZ						18	110	10	10W
1N1607A	S	1N2982RB *	1N2970	DZ						18	110	5.0	10W
1N1608	S	1N2985RA *	1N2970	DZ						22	90	10	10W
1N1608A	S	1N2985RB *	1N2970	DZ						22	90	5.0	10W
1N1609	S	1N2988RA *	1N2970	DZ						27	70	10	10W
1N1609A	S	1N2988RB *	1N2970	DZ						27	70	5.0	10W
1N1610	S	Microwave S-X-band	Detector										
1N1611	S	Microwave C-X-band	Detector										
1N1611A	S	Microwave C-X-band	Detector										
1N1611B	S	Microwave C-X-band	Detector										
1N1612	S	MR1120 *	MR1120	R	50	1.5	5.0	1.0					
1N1613	S	MR1121 *	MR1120	R	100	1.5	5.0	1.0					
1N1614	S	MR1122 *	MR1120	R	200	1.5	5.0	1.0					
1N1615	S	MR1124 *	MR1120	R	400	1.5	5.0	1.0					
1N1616	S	MR1126 *	MR1120	R	600	1.5	5.0	1.0					
1N1617	S	1N4002	1N4001	R	100	1.2	1.5		60				
1N1618	S	1N4003	1N4001	R	200	1.2	1.5		60				
1N1619	S	1N4004	1N4001	R	300	1.2	1.5		60				
1N1620	S	1N4004	1N4001	R	400	1.2	1.5		60				
1N1621	S			R	100	1.2	10		80				
1N1622	S			R	200	1.2	10		80				
1N1623	S			R	300	1.2	10		80				
1N1624	S			R	400	1.2	10		80				
1N1625	Se			R	48	1.0		0.015	0.005				
1N1625A	Se			R	48	1.0		0.015	0.01				
1N1626	Se			R	96	2.0		0.015	0.005				
1N1626A	Se			R	96	2.0		0.015	0.01				
1N1627	Se			R	48	1.0		0.027	0.08				
1N1628	Se			R	96	2.0		0.027	0.08				
1N1629	Se			R	144	3.0		0.027	0.08				
1N1630	Se			R	192	4.0		0.027	0.08				
1N1631	Se			R	240	5.0		0.027	0.08				
1N1632	Se			R	288	6.0		0.027	0.08				
1N1633	Se			R	336	7.0		0.027	0.08				
1N1634	Se			R	384	8.0		0.027	0.08				
1N1635	Se			R	48	1.0		0.108	0.25				
1N1636	Se			R	96	2.0		0.108	0.25				
1N1637	Se			R	144	3.0		0.108	0.25				
1N1638	Se			R	192	4.0		0.108	0.25				
1N1639	Se			R	240	5.0		0.108	0.25				
1N1640	Se			R	48	1.0	0.028	0.240	0.55				
1N1641	Se			R	96	2.0	0.028	0.240	0.55				
1N1642	Se			R	144	3.0	0.028	0.240	0.55				
1N1644	S			R	50	0.5	0.25	0.4	15				
1N1645	S			R	100	0.5	0.25	0.4	15				
1N1646	S			R	150	0.5	0.25	0.3	15				
1N1647	S			R	200	0.5	0.25	0.3	15				
1N1648	S			R	250	0.5	0.25	0.3	15				
1N1649	S			R	300	0.5	0.25	0.3	15				
1N1650	S			R	350	0.5	0.25	0.3	15				

Replacement \* denotes exact device type replacement available on request.



**1N1651-1N1749**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1651	S			R	400	0.5	0.25	0.3	15				
1N1652	S			R	500	0.5	0.25	0.3	15				
1N1653	S			R	600	0.5	0.25	0.3	15				
1N1660	S			R	50			160	40				
1N1661	S	MR1221SB	MR1220	R	100			160	40				
1N1662	S	MR1222SB	MR1220	R	150			160	40				
1N1663	S	MR1223SB	MR1220	R	200			160	40				
1N1664	S	MR1225SB	MR1220	R	300			160	40				
1N1665	S	MR1227SB	MR1220	R	400			160	40				
1N1666	S	MR1228SB	MR1220	R	500			160	40				
1N1670	S			R	50			240	50				
1N1671	S			R	100			240	50				
1N1672	S			R	150			240	50				
1N1673	S			R	200			240	50				
1N1674	S			R	300			240	50				
1N1675	S			R	400			240	50				
1N1676	S			R	500			240	50				
1N1680	S			R	150	1.1	50	25	700				
1N1681	S			R	250	1.1	50	25	700				
1N1682	S			R	300	1.1	50	25	700				
1N1683	S			R	350	1.1	50	25	700				
1N1684	S			R	400	1.1	50	25	700				
1N1685	S			R	450	1.1	50	25	700				
1N1686	S			R	500	1.1	50	25	700				
1N1687	S			R	600	1.1	50	25	700				
1N1688	S			R	700	1.1	50	25	700				
1N1689	S			R	800	1.1	50	25	700				
1N1690	S			R	900	1.1	50	25	700				
1N1691	S			R	1000	1.1	50	25	700				
1N1692	S	1N4002	1N4001	R	100	0.6	0.25	0.5	20				
1N1693	S	1N4003	1N4001	R	200	0.6	0.25	0.5	20				
1N1694	S	1N4004	1N4001	R	300	0.6	0.25	0.5	20				
1N1695	S	1N4004	1N4001	R	400	0.6	0.25	0.5	20				
1N1696	S	1N4005	1N4001	R	500	0.6		0.5	20				
1N1697	S	1N4005	1N4001	R	600	0.6		0.5	20				
1N1698	S			R	6600	33	0.062						
1N1699	S			R	10K	37	0.058						
1N1700	S			R	12K	45	0.05						
1N1701	S	1N4001	1N4001	R	50	1.3	0.3	0.2	8.0				
1N1702	S	1N4001	1N4001	R	100	1.3	0.3	0.2	8.0				
1N1703	S	1N4003	1N4001	R	200	1.3	0.3	0.2	8.0				
1N1704	S	1N4004	1N4001	R	300	1.3	0.3	0.2	8.0				
1N1705	S	1N4004	1N4001	R	400	1.3	0.3	0.2	8.0				
1N1706	S	1N4005	1N4001	R	500	1.3	0.3	0.2	8.0				
1N1707	S	1N4001	1N4001	R	50	1.15	0.5	0.2	10				
1N1708	S	1N4002	1N4001	R	100	1.15	0.5	0.2	10				
1N1709	S	1N4003	1N4001	R	200	1.15	0.5	0.2	10				
1N1710	S	1N4004	1N4001	R	300	1.15	0.5	0.2	10				
1N1711	S	1N4004	1N4001	R	400	1.15	0.5	0.2	10				
1N1712	S	1N4005	1N4001	R	500	1.15	0.5	0.2	10				
1N1730	S	1N4007	1N4001	R	1000	5.0		0.1	2.5				
1N1730A	S			R	1000		0.35		6.0				
1N1731	S	MR991A	MR990A	R	1500	5.0		0.1	2.5				
1N1731A	S			R	1500		0.35		6.0				
1N1732	S	MR992A	MR990A	R	2000	9.0		0.1	2.5				
1N1732A	S			R	2000		0.35		6.0				
1N1733	S	MR994A	MR990A	R	3000	12		0.1	2.5				
1N1733A	S			R	3000		0.35		6.0				
1N1734	S	MR996A	MR990A	R	5000	18		0.1	2.5				
1N1734A	S			R	5000		0.35		6.0				
1N1735	S	1N821 *	1N821	DR						6.2	0.8	7.5	-55/150
1N1736	S	1N941A *	1N941	DR						12.4	0.8	7.5	-55/150
1N1736A	S	1N942A *	1N941	DR						12.4	0.4	7.5	-55/150
1N1737	S	1N4060 *	1N429	DR						18.6	0.8	7.5	-55/150
1N1737A	S	1N4060A *	1N429	DR						18.6	0.4	7.5	-55/150
1N1738	S	1N4062 *	1N429	DR						24.8	0.8	7.5	-55/150
1N1738A	S	1N4062A *	1N429	DR						24.8	0.4	7.5	-55/150
1N1739	S	1N4064 *	1N429	DR						31	0.8	7.5	-55/150
1N1739A	S	1N4064A *	1N429	DR						31	0.4	7.5	-55/150
1N1740	S	1N4066 *	1N429	DR						37.2	0.8	7.5	-55/150
1N1740A	S	1N4066A *	1N429	DR						37.2	0.4	7.5	-55/150
1N1741	S	1N4067 *	1N429	DR						43.4	0.8	7.5	-55/150
1N1741A	S	1N4067A *	1N429	DR						43.4	0.4	7.5	-55/150
1N1742	S	1N4069 *	1N429	DR						49.6	0.8	7.5	-55/150
1N1742A	S	1N4069A *	1N429	DR						49.6	0.4	7.5	-55/150
1N1743	S	1N2974A	1N2970	DZ						10	250	10	10W
1N1744	S	1N4740	1N4728	DZ						10	25	10	1.0W
1N1745	S			R	1500	15	0.32	0.2	3.5				
1N1746	S			R	1500	7.5	0.5	0.2	3.5				
1N1747	S			R	1800	18	0.31	0.2	3.5				
1N1748	S			R	1800	9.0	0.38	0.2	3.5				
1N1749	S			R	2400	24	0.37	0.2	3.5				

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1750	S			R	2400	12	0.32	0.2	3.5				
1N1751	S			R	3600	27	0.42	0.2	3.5				
1N1752	S			R	3600	18	0.41	0.2	3.5				
1N1753	S			R	4800	36	0.38	0.2	3.5				
1N1754	S			R	4800	24	0.37	0.2	3.5				
1N1755	S			R	6000	45	0.33	0.2	3.5				
1N1756	S			R	6000	30	0.41	0.2	3.5				
1N1757	S			R	7200	54	0.33	0.2	3.5				
1N1758	S			R	7200	36	0.38	0.2	3.5				
1N1759	S			R	8000	60	0.29	0.2	3.5				
1N1760	S			R	12K	60	0.29	0.2	3.5				
1N1761	S			R	14K	52	0.34	0.2	3.5				
1N1762	S			R	16K	60	0.29	0.2	3.5				
1N1763	S	1N4004	1N4001	R	400	3.0	0.5	0.1	35				
1N1763A	S			R	400	1.2	1.0	0.5	25				
1N1764	S	1N4005	1N4001	R	500	3.0	0.5	0.1	35				
1N1764A	S			R	500	1.2	1.0	0.5	25				
1N1765	S	1N4734 *	1N4728	DZ						5.6	100	10	1.0W
1N1765A	S	1N4734A *	1N4728	DZ						5.6	100	5.0	1.0W
1N1766	S	1N4735 *	1N4728	DZ						6.2	100	10	1.0W
1N1766A	S	1N4735A *	1N4728	DZ						6.2	100	5.0	1.0W
1N1767	S	1N4736 *	1N4728	DZ						6.8	100	10	1.0W
1N1767A	S	1N4736A *	1N4728	DZ						6.8	100	5.0	1.0W
1N1768	S	1N4737 *	1N4728	DZ						7.5	100	10	1.0W
1N1768A	S	1N4737A *	1N4728	DZ						7.5	100	5.0	1.0W
1N1769	S	1N4738 *	1N4728	DZ						8.2	100	10	1.0W
1N1769A	S	1N4738A *	1N4728	DZ						8.2	100	5.0	1.0W
1N1770	S	1N4739 *	1N4728	DZ						9.1	50	10	1.0W
1N1770A	S	1N4739A *	1N4728	DZ						9.1	50	5.0	1.0W
1N1771	S	1N4740 *	1N4728	DZ						10	50	10	1.0W
1N1771A	S	1N4740A *	1N4728	DZ						10	50	5.0	1.0W
1N1772	S	1N4741 *	1N4728	DZ						11	50	10	1.0W
1N1772A	S	1N4741A *	1N4728	DZ						11	50	5.0	1.0W
1N1773	S	1N4742 *	1N4728	DZ						12	50	10	1.0W
1N1773A	S	1N4742A *	1N4728	DZ						12	50	5.0	1.0W
1N1774	S	1N4743 *	1N4728	DZ						13	50	10	1.0W
1N1774A	S	1N4743A *	1N4728	DZ						13	50	5.0	1.0W
1N1775	S	1N4744 *	1N4728	DZ						15	50	10	1.0W
1N1775A	S	1N4744A *	1N4728	DZ						15	50	5.0	1.0W
1N1776	S	1N4745 *	1N4728	DZ						16	50	10	1.0W
1N1776A	S	1N4745A *	1N4728	DZ						16	50	5.0	1.0W
1N1777	S	1N4746 *	1N4728	DZ						18	50	10	1.0W
1N1777A	S	1N4746A *	1N4728	DZ						18	50	5.0	1.0W
1N1778	S	1N4747 *	1N4728	DZ						20	15	10	1.0W
1N1778A	S	1N4747A *	1N4728	DZ						20	15	5.0	1.0W
1N1779	S	1N4748 *	1N4728	DZ						22	15	10	1.0W
1N1779A	S	1N4748A *	1N4728	DZ						22	15	5.0	1.0W
1N1780	S	1N4749 *	1N4728	DZ						24	15	10	1.0W
1N1780A	S	1N4749A *	1N4728	DZ						24	15	5.0	1.0W
1N1781	S	1N4750 *	1N4728	DZ						27	15	10	1.0W
1N1781A	S	1N4750A *	1N4728	DZ						27	15	5.0	1.0W
1N1782	S	1N4751 *	1N4728	DZ						30	15	10	1.0W
1N1782A	S	1N4751A *	1N4728	DZ						30	15	5.0	1.0W
1N1783	S	1N4752 *	1N4728	DZ						33	15	10	1.0W
1N1783A	S	1N4752A *	1N4728	DZ						33	15	5.0	1.0W
1N1784	S	1N4753 *	1N4728	DZ						36	15	10	1.0W
1N1784A	S	1N4753A *	1N4728	DZ						36	15	5.0	1.0W
1N1785	S	1N4754 *	1N4728	DZ						39	15	10	1.0W
1N1785A	S	1N4754A *	1N4728	DZ						39	15	5.0	1.0W
1N1786	S	1N4755 *	1N4728	DZ						43	15	10	1.0W
1N1786A	S	1N4755A *	1N4728	DZ						43	15	5.0	1.0W
1N1787	S	1N4756 *	1N4728	DZ						47	15	10	1.0W
1N1787A	S	1N4756A *	1N4728	DZ						47	15	5.0	1.0W
1N1788	S	1N4757 *	1N4728	DZ						51	15	10	1.0W
1N1788A	S	1N4757A *	1N4728	DZ						51	15	5.0	1.0W
1N1789	S	1N4758 *	1N4728	DZ						56	15	10	1.0W
1N1789A	S	1N4758A *	1N4728	DZ						56	15	5.0	1.0W
1N1790	S	1N4759 *	1N4728	DZ						62	5.0	10	1.0W
1N1790A	S	1N4759A *	1N4728	DZ						62	5.0	5.0	1.0W
1N1791	S	1N4760 *	1N4728	DZ						68	5.0	10	1.0W
1N1791A	S	1N4760A *	1N4728	DZ						68	5.0	5.0	1.0W
1N1792	S	1N4761 *	1N4728	DZ						75	5.0	10	1.0W
1N1792A	S	1N4761A *	1N4728	DZ						75	5.0	5.0	1.0W
1N1793	S	1N4762 *	1N4728	DZ						82	5.0	10	1.0W
1N1793A	S	1N4762A *	1N4728	DZ						82	5.0	5.0	1.0W
1N1794	S	1N4763 *	1N4728	DZ						91	5.0	10	1.0W
1N1794A	S	1N4763A *	1N4728	DZ						91	5.0	5.0	1.0W
1N1795	S	1N4764 *	1N4728	DZ						100	5.0	10	1.0W
1N1795A	S	1N4764A *	1N4728	DZ						100	5.0	5.0	1.0W
1N1796	S	1M110ZS10 *	1N4728	DZ						110	5.0	10	1.0W
1N1796A	S	1M110ZS5 *	1N4728	DZ						110	5.0	5.0	1.0W
1N1797	S	1M120ZS10 *	1N4728	DZ						120	5.0	10	1.0W

Replacement \* denotes exact device type replacement available on request.



**1N1797A-1N1840**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N1797A	S	1M120ZS5 *	1N4728	DZ						120	5.0	5.0	1.0W
1N1798	S	1M130ZS10 *	1N4728	DZ						130	5.0	10	1.0W
1N1798A	S	1M130ZS5 *	1N4728	DZ						130	5.0	5.0	1.0W
1N1799	S	1M150ZS10 *	1N4728	DZ						150	5.0	10	1.0W
1N1799A	S	1M150ZS5 *	1N4728	DZ						150	5.0	5.0	1.0W
1N1800	S	1M160ZS10 *	1N4728	DZ						160	5.0	10	1.0W
1N1800A	S	1M160ZS5 *	1N4728	DZ						160	5.0	5.0	1.0W
1N1801	S	1M180ZS10 *	1N4728	DZ						180	5.0	10	1.0W
1N1801A	S	1M180ZS5 *	1N4728	DZ						180	5.0	5.0	1.0W
1N1802	S	1M200ZS10 *	1N4728	DZ						200	5.0	10	1.0W
1N1802A	S	1M200ZS5 *	1N4728	DZ						200	5.0	5.0	1.0W
1N1803	S	1N3997R	1N3993	DZ						5.6	5.0	10	10W
1N1803A	S	1N3997RA *	1N3993	DZ						5.6	1000	5.0	10W
1N1804	S	1N3998R *	1N3993	DZ						6.2	1000	10	10W
1N1804A	S	1N3998RA *	1N3993	DZ						6.2	1000	5.0	10W
1N1805	S	1N2970A *	1N2970	DZ						6.8	1000	10	10W
1N1805A	S	1N2970B *	1N2970	DZ						6.8	1000	5.0	10W
1N1806	S	1N2971A *	1N2970	DZ						7.5	1000	10	10W
1N1806A	S	1N2971B *	1N2970	DZ						7.5	1000	5.0	10W
1N1807	S	1N2972A *	1N2970	DZ						8.2	1000	10	10W
1N1807A	S	1N2972B *	1N2970	DZ						8.2	1000	5.0	10W
1N1808	S	1N2973A *	1N2970	DZ						9.1	1000	10	10W
1N1808A	S	1N2973B *	1N2970	DZ						9.1	500	5.0	10W
1N1809	S	1N3007A *	1N2970	DZ						110	50	10	10W
1N1809A	S	1N3007B *	1N2970	DZ						110	50	5.0	10W
1N1810	S	1N3008A *	1N2970	DZ						120	50	10	10W
1N1810A	S	1N3008B *	1N2970	DZ						120	50	5.0	10W
1N1811	S	1N3009A *	1N2970	DZ						130	50	10	10W
1N1811A	S	1N3009B *	1N2970	DZ						130	50	5.0	10W
1N1812	S	1N3011A *	1N2970	DZ						150	50	10	10W
1N1812A	S	1N3011B *	1N2970	DZ						150	50	5.0	10W
1N1813	S	1N3012A *	1N2970	DZ						160	50	10	10W
1N1813A	S	1N3012B *	1N2970	DZ						160	50	5.0	10W
1N1814	S	1N3014A *	1N2970	DZ						180	50	10	10W
1N1814A	S	1N3014B *	1N2970	DZ						180	50	5.0	10W
1N1815	S	1N3015A *	1N2970	DZ						200	50	10	10W
1N1815A	S	1N3015B *	1N2970	DZ						200	50	5.0	10W
1N1816	S	1N2977A *	1N2970	DZ						13	500	10	10W
1N1816A	S	1N2977B *	1N2970	DZ						13	500	5.0	10W
1N1817	S	1N2979A *	1N2970	DZ						15	500	10	10W
1N1817A	S	1N2979B *	1N2970	DZ						15	500	5.0	10W
1N1818	S	1N2980A *	1N2970	DZ						16	500	10	10W
1N1818A	S	1N2980B *	1N2970	DZ						16	500	5.0	10W
1N1819	S	1N2982A *	1N2970	DZ						18	500	10	10W
1N1819A	S	1N2982B *	1N2970	DZ						18	500	5.0	10W
1N1820	S	1N2984A *	1N2970	DZ						20	250	10	10W
1N1820A	S	1N2984B *	1N2970	DZ						20	250	5.0	10W
1N1821	S	1N2985A *	1N2970	DZ						22	250	10	10W
1N1821A	S	1N2985B *	1N2970	DZ						22	250	5.0	10W
1N1822	S	1N2986A *	1N2970	DZ						24	250	10	10W
1N1822A	S	1N2986B *	1N2970	DZ						24	250	5.0	10W
1N1823	S	1N2988A *	1N2970	DZ						27	250	10	10W
1N1823A	S	1N2988B *	1N2970	DZ						27	250	5.0	10W
1N1824	S	1N2989A *	1N2970	DZ						30	250	10	10W
1N1824A	S	1N2989B *	1N2970	DZ						30	250	5.0	10W
1N1825	S	1N2990A *	1N2970	DZ						33	150	10	10W
1N1825A	S	1N2990B *	1N2970	DZ						33	150	5.0	10W
1N1826	S	1N2991A *	1N2970	DZ						36	150	10	10W
1N1826A	S	1N2991B *	1N2970	DZ						36	150	5.0	10W
1N1827	S	1N2992A *	1N2970	DZ						39	150	10	10W
1N1827A	S	1N2992B *	1N2970	DZ						39	150	5.0	10W
1N1828	S	1N2993A *	1N2970	DZ						43	150	10	10W
1N1828A	S	1N2993B *	1N2970	DZ						43	150	5.0	10W
1N1829	S	1N2995A *	1N2970	DZ						47	150	10	10W
1N1829A	S	1N2995B *	1N2970	DZ						47	150	5.0	10W
1N1830	S	1N2997A *	1N2970	DZ						51	150	10	10W
1N1830A	S	1N2997B *	1N2970	DZ						51	150	5.0	10W
1N1831	S	1N2999A *	1N2970	DZ						56	150	10	10W
1N1831A	S	1N2999B *	1N2970	DZ						56	150	5.0	10W
1N1832	S	1N3000A *	1N2970	DZ						62	50	10	10W
1N1832A	S	1N3000B *	1N2970	DZ						62	50	5.0	10W
1N1833	S	1N3001A *	1N2970	DZ						68	50	10	10W
1N1833A	S	1N3001B *	1N2970	DZ						68	50	5.0	10W
1N1834	S	1N3002A *	1N2970	DZ						75	50	10	10W
1N1834A	S	1N3002B *	1N2970	DZ						75	50	5.0	10W
1N1835	S	1N3003A *	1N2970	DZ						82	50	10	10W
1N1835A	S	1N3003B *	1N2970	DZ						82	50	5.0	10W
1N1836	S	1N3004A *	1N2970	DZ						91	50	10	10W
1N1836A	S	1N3004B *	1N2970	DZ						91	50	5.0	10W
1N1838	G	Microwave X-Ku-band	Mixer; NF = 32 dB	R									
1N1839	S			R	6.8		0.085		0.26				
1N1840	S			R	10		0.077		0.23				

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N1841	S			R	15		0.063		0.19				
1N1842	S			R	22		0.05		0.15				
1N1843	S			R	33		0.04		0.12				
1N1844	S			R	47		0.03		0.095				
1N1845	S			R	68		0.023	0.001	0.072				
1N1846	S			R	100		0.016	0.001	0.050				
1N1847	S			R	150		0.011	0.003	0.035				
1N1848	S			R	220		0.009	0.005	0.028				
1N1849	S			R	330			0.005	0.024				
1N1850	S			R	470		0.006	0.005	0.020				
1N1851	S			R	6.8		0.085		0.26				
1N1852	S			R	10		0.077		0.23				
1N1853	S			R	15		0.063		0.190				
1N1854	S			R	22		0.05		0.150				
1N1855	S			R	33		0.04		0.120				
1N1856	S			R	47		0.03		0.095				
1N1857	S			R	68		0.023	0.001	0.072				
1N1858	S			R	100		0.016	0.001	0.050				
1N1859	S			R	150		0.011	0.003	0.035				
1N1860	S			R	220		0.009	0.005	0.028				
1N1861	S			R	330			0.005	0.024				
1N1862	S			R	470		0.006	0.005	0.020				
1N1863	S			R	6.8		0.085		0.260				
1N1864	S			R	10		0.077		0.230				
1N1865	S			R	15		0.063		0.190				
1N1866	S			R	22		0.05		0.150				
1N1867	S			R	33		0.04		0.120				
1N1868	S			R	47		0.03		0.095				
1N1869	S			R	68		0.023	0.001	0.072				
1N1870	S			R	100		0.016	0.001	0.050				
1N1871	S			R	150		0.011	0.003	0.035				
1N1872	S			R	220		0.009	0.005	0.028				
1N1873	S			R	330			0.005	0.024				
1N1874	S			R	470		0.006	0.005	0.020				
1N1875	S	1N4738	1N4728	DZ						8.2	25	10	1.0W
1N1876	S	1N4740	1N4728	DZ						10	25	10	1.0W
1N1877	S	1N4742	1N4728	DZ						12	25	10	1.0W
1N1878	S	1N4744	1N4728	DZ						15	25	10	1.0W
1N1879	S	1N4746	1N4728	DZ						18	25	10	1.0W
1N1880	S	1N4748	1N4728	DZ						22	8.0	10	1.0W
1N1881	S	1N4750	1N4728	DZ						27	8.0	10	1.0W
1N1882	S	1N4752	1N4728	DZ						33	8.0	10	1.0W
1N1883	S	1N4754	1N4728	DZ						39	8.0	10	1.0W
1N1884	S	1N4756	1N4728	DZ						47	8.0	10	1.0W
1N1885	S	1N4758	1N4728	DZ						56	8.0	10	1.0W
1N1886	S	1N4760	1N4728	DZ						68	3.0	10	1.0W
1N1887	S	1N4762	1N4728	DZ						82	3.0	10	1.0W
1N1888	S	1N4764	1N4728	DZ						100	3.0	10	1.0W
1N1889	S	1M120ZS10	1N4728	DZ						120	3.0	10	1.0W
1N1890	S	1M150ZS10	1N4728	DZ						150	3.0	10	1.0W
1N1891	S	1N2972A	1N2970	DZ						8.2	25	10	10W
1N1892	S	1N2974A	1N2970	DZ						10	25	10	10W
1N1893	S	1N2976A	1N2970	DZ						10	25	10	10W
1N1894	S	1N2979A	1N2970	DZ						15	25	10	10W
1N1895	S	1N2982A	1N2970	DZ						18	25	10	10W
1N1896	S	1N2985A	1N2970	DZ						22	8.0	10	10W
1N1897	S	1N2988A	1N2970	DZ						27	8.0	10	10W
1N1898	S	1N2990A	1N2970	DZ						33	8.0	10	10W
1N1899	S	1N2992A	1N2970	DZ						39	8.0	10	10W
1N1900	S	1N2995A	1N2970	DZ						47	8.0	10	10W
1N1901	S	1N2999A	1N2970	DZ						56	8.0	10	10W
1N1902	S	1N3001A	1N2970	DZ						68	3.0	10	10W
1N1903	S	1N3003A	1N2970	DZ						82	3.0	10	10W
1N1904	S	1N3005A	1N2970	DZ						100	3.0	10	10W
1N1905	S	1N3008A	1N2970	DZ						120	3.0	10	10W
1N1906	S	1N3011A	1N2970	DZ						150	3.0	10	10W
1N1907	S	1N4001	1N4001	R	50	1.0	1.5	0.01	30				
1N1908	S	1N4002	1N4001	R	100	1.0	1.5	0.01	30				
1N1909	S	1N4003	1N4001	R	200	1.0	1.5	0.01	30				
1N1910	S			R	300	1.0	1.5	0.01	30				
1N1911	S	1N4004	1N4001	R	400	1.0	1.5	0.01	30				
1N1912	S	1N4005	1N4001	R	500	1.0	1.5	0.01	30				
1N1913	S	1N4005	1N4001	R	600	1.0	1.5	0.01	30				
1N1914	S	1N4006	1N4001	R	700	1.0	1.5	0.01	30				
1N1915	S	1N4006	1N4001	R	800	1.0	1.5	0.01	30				
1N1916	S	1N4007	1N4001	R	900	1.0	1.5	0.01	30				
1N1917	S			R	50	1.0	4.0	0.01	30				
1N1918	S			R	100	1.0	4.0	0.01	30				
1N1919	S			R	200	1.0	4.0	0.01	30				
1N1920	S			R	300	1.0	4.0	0.01	30				
1N1921	S			R	400	1.0	4.0	0.01	30				
1N1922	S			R	500	1.0	4.0	0.01	30				



**1N1923-1N2004**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)		I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N1923	S			R	600	1.0	4.0	0.01	30				
1N1924	S			R	700	1.0	4.0	0.01	30				
1N1925	S			R	800	1.0	4.0	0.01	30				
1N1926	S			R	900	1.0	4.0	0.01	30				
1N1927	S	1N5228A	1N5221	DZ						3.9	5.0	10	200M
1N1928	S	1N5230A	1N5221	DZ						4.7	5.0	10	200M
1N1929	S	1N5232A	1N5221	DZ						5.6	5.0	10	200M
1N1930	S	1N5235A	1N5221	DZ						6.8	5.0	10	200M
1N1931	S	1N5237A	1N5221	DZ						8.2	5.0	10	200M
1N1932	S	1N5240A	1N5221	DZ						10	5.0	10	200M
1N1933	S	1N5242A	1N5221	DZ						12	5.0	10	200M
1N1934	S	1N5245A	1N5221	DZ						15	1.0	10	200M
1N1935	S	1N5248A	1N5221	DZ						18	1.0	10	200M
1N1936	S	1N5251A	1N5221	DZ						22	1.0	10	200M
1N1937	S	1N5254A	1N5221	DZ						27	1.0	10	200M
1N1938	S	1N5257A	1N5221	DZ						33	0.2	10	200M
1N1939	S	1N5259A	1N5221	DZ						39	0.2	10	200M
1N1940	S	1N5261A	1N5221	DZ						47	0.2	10	200M
1N1941	S	1N5263A	1N5221	DZ						56	0.2	10	200M
1N1942	S	1N5266A	1N5221	DZ						68	0.2	10	200M
1N1943	S	1N5268A	1N5221	DZ						82	0.2	10	200M
1N1944	S	1N5271A	1N5221	DZ						100	0.2	10	200M
1N1945	S	1N5273A	1N5221	DZ						120	0.2	10	200M
1N1946	S	1N5276A	1N5221	DZ						150	0.1	10	200M
1N1947	S	1N5279A	1N5221	DZ						180	0.1	10	200M
1N1948	S	.5M110ZSB10		DZ						220	0.1	10	200M
1N1949	S	.5M135ZSB10		DZ						270	0.1	10	200M
1N1950	S	.5M165ZSB10		DZ						330	0.1	10	200M
1N1951	S	.5M195ZSB10		DZ						390	0.1	10	200M
1N1952	S	.5M155ZSC10		DZ						470	0.1	10	200M
1N1953	S	.5M185ZSC10		DZ						560	0.1	10	200M
1N1954	S	1N5228A	1N5221	DZ						3.9	5.0	10	400M
1N1955	S	1N5230A	1N5221	DZ						4.7	5.0	10	400M
1N1956	S	1N5232A	1N5221	DZ						5.6	5.0	10	400M
1N1957	S	1N5235A	1N5221	DZ						6.8	5.0	10	400M
1N1958	S	1N5237A	1N5221	DZ						8.2	5.0	10	400M
1N1959	S	1N5240A	1N5221	DZ						10	5.0	10	400M
1N1960	S	1N5242A	1N5221	DZ						12	1.0	10	400M
1N1961	S	1N5245A	1N5221	DZ						15	1.0	10	400M
1N1962	S	1N5248A	1N5221	DZ						18	1.0	10	400M
1N1963	S	1N5251A	1N5221	DZ						22	1.0	10	400M
1N1964	S	1N5254A	1N5221	DZ						27	1.0	10	400M
1N1965	S	1N5257A	1N5221	DZ						33	0.2	10	400M
1N1966	S	1N5259A	1N5221	DZ						39	0.2	10	400M
1N1967	S	1N5261A	1N5221	DZ						47	0.2	10	400M
1N1968	S	1N5263A	1N5221	DZ						56	0.2	10	400M
1N1969	S	1N5266A	1N5221	DZ						68	0.2	10	400M
1N1970	S	1N5268A	1N5221	DZ						82	0.2	10	400M
1N1971	S	1N5271A	1N5221	DZ						100	0.2	10	400M
1N1972	S	1N5273A	1N5221	DZ						120	0.2	10	400M
1N1973	S	1N5276A	1N5221	DZ						150	0.1	10	400M
1N1974	S	1N5279A	1N5221	DZ						180	0.1	10	400M
1N1975	S	.5M110ZSB10		DZ						220	0.1	10	400M
1N1976	S	.5M135ZSB10	†	DZ						270	0.1	10	400M
1N1977	S	.5M165ZSB10	†	DZ						330	0.1	10	400M
1N1978	S	.5M195ZSB10	†	DZ						390	0.1	10	400M
1N1979	S	.5M155ZSC10	†	DZ						470	0.1	10	400M
1N1980	S	.5M185ZSC10	†	DZ						560	0.1	10	400M
1N1981	S	1N5228A	1N5221	DZ						3.9	5.0	10	150M
1N1982	S	1N5230A	1N5221	DZ						4.7	5.0	10	150M
1N1983	S	1N5232A	1N5221	DZ						5.6	5.0	10	150M
1N1984	S	1N5235A	1N5221	DZ						6.8	5.0	10	150M
1N1985	S	1N5237A	1N5221	DZ						8.2	5.0	10	150M
1N1986	S	1N5240A	1N5221	DZ						10	5.0	10	150M
1N1987	S	1N5242A	1N5221	DZ						12	1.0	10	150M
1N1988	S	1N5245A	1N5221	DZ						15	1.0	10	150M
1N1989	S	1N5248A	1N5221	DZ						18	1.0	10	150M
1N1990	S	1N5251A	1N5221	DZ						22	1.0	10	150M
1N1991	S	1N5254A	1N5221	DZ						27	1.0	10	150M
1N1992	S	1N5257A	1N5221	DZ						33	0.2	10	150M
1N1993	S	1N5259A	1N5221	DZ						39	0.2	10	150M
1N1994	S	1N5261A	1N5221	DZ						47	0.2	10	150M
1N1995	S	1N5263A	1N5221	DZ						56	0.2	10	150M
1N1996	S	1N5266A	1N5221	DZ						68	0.2	10	150M
1N1997	S	1N5268A	1N5221	DZ						82	0.2	10	150M
1N1998	S	1N5271A	1N5221	DZ						100	0.2	10	150M
1N1999	S	1N5273A	1N5221	DZ						120	0.2	10	150M
1N2000	S	1N5276A	1N5221	DZ						150	0.1	10	150M
1N2001	S	1N5279A	1N5221	DZ						180	0.1	10	150M
1N2002	S	.5M110ZSB10†		DZ						220	0.1	10	150M
1N2003	S	.5M135ZSB10†		DZ						270	0.1	10	150M
1N2004	S	.5M165ZSB10†		DZ						330	0.1	10	150M

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2005	S	.5M195ZSB10	†	DZ						390	0.1	10	150M
1N2006	S	.5M155ZSC10	†	DZ						470	0.1	10	150M
1N2007	S	.5M185ZSC10	†	DZ						560	0.1	10	150M
1N2008	S	1N3005A *	1N2970	DZ						100	50	10	10W
1N2009	S	1N3007A *	1N2970	DZ						110	50	10	10W
1N2010	S	1N3008A *	1N2970	DZ						120	50	10	10W
1N2011	S	1N3009A *	1N2970	DZ						130	50	10	10W
1N2012	S	1N3011A *	1N2970	DZ						150	50	10	10W
1N2013	S			R	50	1.2	0.25	0.25	10				
1N2014	S			R	100	1.2	0.25	0.25	10				
1N2015	S			R	150	1.2	0.25	0.25	10				
1N2016	S			R	200	1.2	0.25	0.25	10				
1N2017	S			R	250	1.2	0.25	0.25	10				
1N2018	S			R	300	1.2	0.25	0.25	10				
1N2019	S			R	350	1.2	0.25	0.25	10				
1N2020	S			R	400	1.2	0.25	0.25	10				
1N2021	S	1N1185	1N1183	R	150	1.5	10	5.0	110				
1N2022	S	1N1187	1N1183	R	250	1.5	10	5.0	110				
1N2023	S	1N1187	1N1183	R	300	1.5	10	5.0	110				
1N2024	S	1N1188	1N1183	R	350	1.5	10	5.0	110				
1N2025	S	1N1188	1N1183	R	400	1.5	10	5.0	110				
1N2026	S	MR1120	MR1120	R	50	2.0	1.0	0.5	25				
1N2027	S	MR1122	MR1120	R	200	2.0	1.0	0.5	25				
1N2028	S	MR1123	MR1120	R	300	2.0	1.0	0.5	25				
1N2029	S	MR1124	MR1120	R	400	2.0	1.0	0.5	25				
1N2030	S	MR1125	MR1120	R	500	2.0	1.0	0.5	25				
1N2031	S	MR1126	MR1120	R	600	2.0	1.0	0.5	25				
1N2032	S	1N4732 *	1N4728	DZ						4.4	10	5.0	750M
1N2033	S	1N4734 *	1N4728	DZ						5.6	10	5.0	750M
1N2034	S	1N4736 *	1N4728	DZ						6.6	10	5.0	750M
1N2035	S	1N4739 *	1N4728	DZ						8.8	10	5.0	750M
1N2036	S	1N4740 *	1N4728	DZ						10.5	5.0	5.0	750M
1N2037	S	1N4743 *	1N4728	DZ						12.8	5.0	5.0	750M
1N2038	S	1N4745 *	1N4728	DZ						15.8	5.0	5.0	750M
1N2039	S	1N4747 *	1N4728	DZ						19	5.0	5.0	750M
1N2040	S	1N4749 *	1N4728	DZ						23.5	5.0	5.0	750M
1N2041	S	1N3995 *	1N3993	DZ						4.9	1.0	5.0	10W
1N2042	S	1N3997 *	1N3993	DZ						5.8	1.0	5.0	10W
1N2043	S	1N2970RA *	1N2970	DZ						6.6	1.0	5.0	10W
1N2044	S	1N2973RA *	1N2970	DZ						8.8	500	5.0	10W
1N2045	S	1N2974RB *	1N2970	DZ						10.5	500	5.0	10W
1N2046	S	1N2977RA *	1N2970	DZ						12.8	500	5.0	10W
1N2047	S	1N2980RA *	1N2970	DZ						15.8	500	5.0	10W
1N2048	S	1N2983RA *	1N2970	DZ						19	500	5.0	10W
1N2049	S	1N2986RA *	1N2970	DZ						23.5	150	5.0	10W
1N2054	S	MR1230SB	MR1230	R	50	1.6	250	55	4500				
1N2055	S	MR1231SB	MR1230	R	100	1.6	250	55	4500				
1N2056	S	MR1232SB	MR1230	R	150	1.6	250	55	4500				
1N2057	S	MR1233SB	MR1230	R	200	1.6	250	55	4500				
1N2058	S	MR1234SB	MR1230	R	250	1.6	250	55	4500				
1N2059	S	MR1235SB	MR1230	R	300	1.6	250	55	4500				
1N2060	S	MR1236SB	MR1230	R	350	1.6	250	55	4500				
1N2061	S	MR1237SB	MR1230	R	400	1.6	250	55	4500				
1N2062	S	MR1238SB	MR1230	R	450	1.6	250	55	4500				
1N2063	S	MR1238SB	MR1230	R	500	1.6	250	55	4500				
1N2064	S	MR1239SB	MR1230	R	600	1.6	250	55	4500				
1N2065	S			R	700	1.6	250	55	4500				
1N2066	S			R	800	1.6	250	55	4500				
1N2067	S			R	900	1.6	250	55	4500				
1N2068	S			R	1000	1.6	250	55	4500				
1N2069	S	1N4003	1N4001	R	200	0.6	0.75	0.2	22				
1N2069A	S	1N4003	1N4001	R	200	0.5	0.75	0.05	22				
1N2070	S	1N4004	1N4001	R	400	0.6	0.75	0.2	22				
1N2070A	S	1N4004	1N4001	R	400	0.5	0.75	0.05	22				
1N2071	S	1N4005	1N4001	R	600	0.6	0.75	0.2	22				
1N2071A	S	1N4005	1N4001	R	600	0.5	0.75	0.05	22				
1N2072	S	1N4001	1N4001	R	50	1.1	0.625	0.25	30				
1N2073	S	1N4002	1N4001	R	100	1.1	0.625	0.25	30				
1N2074	S	1N4003	1N4001	R	150	1.1	0.625	0.25	30				
1N2075	S	1N4003	1N4001	R	200	1.1	0.625	0.25	30				
1N2076	S	1N4004	1N4001	R	250	1.1	0.625	0.25	30				
1N2077	S	1N4004	1N4001	R	300	1.1	0.625	0.25	30				
1N2078	S	1N4004	1N4001	R	400	1.1	0.625	0.25	30				
1N2079	S	1N4005	1N4001	R	500	1.1	0.625	0.25	30				
1N2080	S	1N4001	1N4001	R	50	0.75	0.5	0.35	15				
1N2081	S	1N4002	1N4001	R	100	0.75	0.5	0.35	15				
1N2082	S	1N4003	1N4001	R	200	0.75	0.5	0.35	15				
1N2083	S	1N4004	1N4001	R	300	0.75	0.5	0.35	15				
1N2084	S	1N4004	1N4001	R	400	0.75	0.5	0.35	15				
1N2085	S	1N4005	1N4001	R	500	0.75	0.5	0.35	15				
1N2086	S			R	600	0.75	0.5	0.35	15				
1N2088	S			R	500	1.2	0.75	0.5	30				

Replacement \* denotes exact device type replacement available on request.

†See page 1-1a for ordering information.



**1N2089-1N2167A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2089	S			R	600	1.2	0.75	0.5	30				
1N2090	S			R	50	0.5	0.5	0.25	15				
1N2091	S			R	100	0.5	0.5	0.25	15				
1N2092	S			R	200	0.5	0.5	0.25	15				
1N2093	S			R	300	0.5	0.5	0.25	15				
1N2094	S			R	400	0.5	0.5	0.25	15				
1N2095	S			R	500	0.5	0.5	0.25	15				
1N2096	S			R	600	0.5	0.5	0.25	15				
1N2102	S	Microwave L-S-band	Detector	R									
1N2103	S			R	50	1.2	0.75	0.3	10				
1N2104	S			R	100	1.2	0.75	0.3	10				
1N2105	S			R	200	1.2	0.75	0.3	10				
1N2106	S	1N4004	1N4001	R	300	1.2	0.75	0.3	10				
1N2107	S	1N4004	1N4001	R	400	1.2	0.75	0.3	10				
1N2108	S	1N4005	1N4001	R	500	1.2	0.75	0.3	10				
1N2109	S			R	50	1.2	2.0	0.3	10				
1N2110	S			R	100	1.2	2.0	0.3	10				
1N2111	S			R	200	1.2	2.0	0.3	10				
1N2112	S			R	300	1.2	2.0	0.3	10				
1N2113	S			R	400	1.2	2.0	0.3	10				
1N2114	S			R	500	1.2	2.0	0.3	10				
1N2115	S	1N4004	1N4001	R	365	0.8	0.2	0.25	10				
1N2116	S			R	400	1.4	0.5	0.4	15				
1N2117	S	1N4006	1N4001	R	720	1.3	0.75	0.010	15				
1N2127	S	Microwave L-X-band	Detector										
1N2127A	S												
1N2128	S	MR1200FL	MR1200	R	50	2.0	60	10	700				
1N2128A	S	MR1200FL	MR1200	R	50	2.0	60	10	900				
1N2129	S	MR1201FL	MR1200	R	100	2.0	60	10	700				
1N2129A	S	MR1201FL	MR1200	R	100	2.0	60	10	900				
1N2130	S	MR1202FL	MR1200	R	150	2.0	60	10	700				
1N2130A	S	MR1202FL	MR1200	R	150	2.0	60	10	900				
1N2131	S	MR1203FL	MR1200	R	200	2.0	60	10	700				
1N2131A	S	MR1203FL	MR1200	R	200	2.0	60	10	900				
1N2132	S	MR1204FL	MR1200	R	250	2.0	60	10	700				
1N2132A	S	MR1204FL	MR1200	R	250	2.0	60	10	900				
1N2133	S	MR1205FL	MR1200	R	300	2.0	60	10	700				
1N2133A	S	MR1205FL	MR1200	R	300	2.0	60	10	900				
1N2134	S	MR1206FL	MR1200	R	350	2.0	60	10	700				
1N2134A	S	MR1206FL	MR1200	R	350	2.0	60	10	900				
1N2135	S	MR1207FL	MR1200	R	400	2.0	60	10	700				
1N2135A	S	MR1207FL	MR1200	R	400	2.0	60	10	900				
1N2136	S			R	450	2.0	60	10	700				
1N2136A	S			R	450	2.0	60	10	900				
1N2137	S			R	500	2.0	60	10	700				
1N2137A	S			R	500	2.0	60	10	900				
1N2138	S			R	600	2.0	60	10	700				
1N2138A	S			R	600	2.0	60	10	900				
1N2139	S			R	20K	60	0.052	0.2	3.5				
1N2146	S			DS	120	1.1	500M	1.0*	0.1				
1N2147	S			R	50	1.2	6.0	0.5	150				
1N2147A	S			R	50	1.0	6.0	0.1	150				
1N2148	S			R	100	1.2	6.0	0.5	150				
1N2148A	S			R	100	1.0	6.0	0.1	150				
1N2149	S			R	200	1.2	6.0	0.5	150				
1N2149A	S			R	200	1.0	6.0	0.1	150				
1N2150	S			R	300	1.2	6.0	0.5	150				
1N2150A	S			R	300	1.0	6.0	0.1	150				
1N2151	S			R	400	1.2	6.0	0.5	150				
1N2151A	S			R	400	1.0	6.0	0.1	150				
1N2152	S			R	500	1.2	6.0	0.5	150				
1N2152A	S			R	500	1.0	6.0	0.1	150				
1N2153	S			R	600	1.2	6.0	0.5	150				
1N2153A	S			R	600	1.0	6.0	0.1	150				
1N2154	S	1N1183	1N1183	R	50	0.6	25	5.0	300				
1N2155	S			R	100	0.6	25	4.5	300				
1N2156	S			R	200	0.6	25	4.0	300				
1N2157	S			R	300	0.6	25	3.5	300				
1N2158	S	1N1188	1N1183	R	400	0.6	25	3.0	300				
1N2159	S	1N1189	1N1183	R	500	0.6	25	2.5	300				
1N2160	S	1N1190	1N1183	R	600	0.6	25	2.0	300				
1N2163	S			DR						9.4	0.05	10	0/+70
1N2163A	S		1N2163	DR						9.4	0.05	10	0/+70
1N2164	S		1N2163	DR						9.4	0.05	10	-55/+125
1N2164A	S		1N2163	DR						9.4	0.05	10	-55/+125
1N2165	S		1N2163	DR						9.4	0.05	10	-55/+185
1N2165A	S		1N2163	DR						9.4	0.05	10	-55/+185
1N2166	S		1N2163	DR						9.4	0.001	10	0/+70
1N2166A	S		1N2163	DR						9.4	0.001	10	0/+70
1N2167	S		1N2163	DR						9.4	0.001	10	-55/+125
1N2167A	S		1N2163	DR						9.4	0.001	10	-55/+125



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{surge}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_Z \pm \%$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ @ (volts)	$I_F$	$I_R$	$t_{rr}$ ( $\mu s$ )	$V_Z$ (nom)	$T_C$ °C	$I_{ZT}$ mA	Temp Range
1N2168	S		1N2163	DR						9.4	0.001	10	-55/+185
1N2168A	S		1N2163	DR						9.4	0.001	10	-55/+185
1N2169	S		1N2163	DR						9.4	0.0005	10	0/+70
1N2169A	S		1N2163	DR						9.4	0.0005	10	0/+70
1N2170	S		1N2163	DR						9.4	0.0005	10	-55/+125
1N2170A	S		1N2163	DR						9.4	0.0005	10	-55/+125
1N2171	S		1N2163	DR						9.4	0.0005	10	-55/+185
1N2171A	S		1N2163	DR						9.4	0.0005	10	-55/+185
1N2172	S		R	R	50	1.5	50	0.25	525				
1N2173	S		R	R	100	1.5	50	0.25	525				
1N2174	S		R	R	200	1.5	50	0.25	525				
1N2175	S	Photosensitive Device; $I_{R(dark)} = 0.5 \mu A @ 50 V$ , Sensitivity = $0.22 \mu A/mW/cm^2$											
1N2176	S		R	R	50	1.1	3.0	0.3	15				
1N2177	S		R	R	100	1.1	3.0	0.3	15				
1N2178	S		R	R	150	1.1	3.0	0.3	15				
1N2179	S		R	R	200	1.1	3.0	0.3	15				
1N2180	S		R	R	300	1.1	3.0	0.3	15				
1N2181	S		R	R	400	1.1	3.0	0.3	15				
1N2182	S		R	R	500	1.1	3.0	0.3	15				
1N2183	S		R	R	600	1.1	3.0	0.3	15				
1N2184	S		R	R	50	1.5	3.0	5.0	40				
1N2185	S		R	R	100	1.5	3.0	5.0	40				
1N2186	S		R	R	150	1.5	3.0	5.0	40				
1N2187	S		R	R	200	1.5	3.0	5.0	40				
1N2188	S		R	R	300	1.5	3.0	5.0	40				
1N2189	S		R	R	400	1.5	3.0	5.0	40				
1N2190	S		R	R	500	1.5	3.0	5.0	40				
1N2191	S		R	R	600	1.5	3.0	5.0	40				
1N2192	S		R	R	800	1.5	3.0	5.0	40				
1N2193	S		R	R	1000	1.5	3.0	5.0	40				
1N2194	S		R	R	50	1.25	6.0	10	100				
1N2195	S		R	R	100	1.25	6.0	10	100				
1N2196	S		R	R	150	1.25	6.0	10	100				
1N2197	S		R	R	200	1.25	6.0	10	100				
1N2198	S		R	R	300	1.25	6.0	10	100				
1N2199	S		R	R	400	1.25	6.0	10	100				
1N2200	S		R	R	500	1.25	6.0	10	100				
1N2201	S		R	R	600	1.25	6.0	10	100				
1N2202	S		R	R	800	1.25	6.0	10	100				
1N2203	S		R	R	1000	1.25	6.0	10	100				
1N2204	S		R	R	50	1.25	12	10	200				
1N2205	S		R	R	100	1.25	12	10	200				
1N2206	S		R	R	150	1.25	12	10	200				
1N2207	S		R	R	200	1.25	12	10	200				
1N2208	S		R	R	300	1.25	12	10	200				
1N2209	S		R	R	400	1.25	12	10	200				
1N2210	S		R	R	500	1.25	12	10	200				
1N2211	S		R	R	600	1.25	12	10	200				
1N2212	S		R	R	800	1.25	12	10	200				
1N2213	S		R	R	1000	1.25	12	10	200				
1N2214	S	1M5.5ZS1	†	DZ						5.6	35		1.0W
1N2217	S	MR1120	MR1120	R	50	1.5	0.003	20					
1N2218	S	MR1125	MR1120	R	500	1.2	0.4	0.003	20				
1N2219	S		MR1120	R	500	1.5	0.003	20					
1N2220	S	MR1126	MR1120	R	600	1.2	0.4	0.003	20				
1N2221	S		MR1120	R	600	1.5	0.003	20					
1N2222	S	MR1128	MR1120	R	800	1.2	0.3	0.003	20				
1N2222A	S		MR1120	R	800	1.2	0.3	0.003	20				
1N2223	S		R	R	800	1.0	0.003	20					
1N2223A	S		R	R	800	1.0	0.003	20					
1N2224	S	MR1130	MR1120	R	1000	1.2	0.3	0.003	20				
1N2224A	S		MR1120	R	1000	1.2	0.3	0.003	20				
1N2225	S		MR1120	R	1000	1.0	0.003	20					
1N2225A	S		MR1120	R	1000	1.0	0.003	20					
1N2226	S		MR1120	R	1200	1.2	0.3	0.003	20				
1N2226A	S		MR1120	R	1200	1.2	0.3	0.003	20				
1N2227	S		MR1120	R	1200	1.0	0.003	20					
1N2227A	S		MR1120	R	1200	1.0	0.003	20					
1N2228	S	MR1120	MR1120	R	50	1.2	1.0	0.003	100				
1N2228A	S	MR1120	MR1120	R	50	1.2	1.6	0.003	100				
1N2229	S		MR1120	R	50	5.0	0.003	100					
1N2229A	S		MR1120	R	50	5.0	0.003	100					
1N2230	S	MR1122	MR1120	R	200	1.2	1.0	0.003	100				
1N2230A	S	MR1122	MR1120	R	200	1.2	1.6	0.003	100				
1N2231	S		MR1120	R	200	5.0	0.003	100					
1N2231A	S	MR1123	MR1120	R	200	5.0	0.003	100					
1N2232	S	MR1123	MR1120	R	300	1.2	1.0	0.003	100				
1N2232A	S		MR1120	R	300	1.2	1.6	0.003	100				
1N2233	S		MR1120	R	300	5.0	0.003	100					
1N2233A	S		MR1120	R	300	5.0	0.003	100					
1N2234	S	MR1124	MR1120	R	400	1.2	1.0	0.003	100				
1N2234A	S	MR1124	MR1120	R	400	1.2	1.6	0.003	100				

\*See page 1-1a for ordering information.



**1N2235-1N2285**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2235	S			R	400		5.0	0.003	100				
1N2235A	S			R	400		5.0	0.003	100				
1N2236	S	MR1125	MR1120	R	500	1.2	1.0	0.003	100				
1N2236A	S	MR1125	MR1120	R	500	1.2	1.6	0.003	100				
1N2237	S			R	500		5.0	0.003	100				
1N2237A	S			R	500		5.0	0.003	100				
1N2238	S	MR1126	MR1120	R	600	1.2	1.0	0.003	100				
1N2238A	S	MR1126	MR1120	R	600	1.2	1.6	0.003	100				
1N2239	S			R	600		5.0	0.003	100				
1N2239A	S			R	600		5.0	0.003	100				
1N2240	S	MR1128	MR1120	R	800	1.2	1.5	0.003	100				
1N2240A	S	MR1128	MR1120	R	800	1.2	1.5	0.003	100				
1N2241	S			R	800		5.0	0.003	100				
1N2241A	S			R	800		5.0	0.003	100				
1N2242	S	MR1130	MR1120	R	1000	1.2	1.5	0.003	100				
1N2242A	S	MR1130	MR1120	R	1000	1.2	1.6	0.003	100				
1N2243	S			R	1000		5.0	0.003	100				
1N2243A	S			R	1000		5.0	0.003	100				
1N2244	S			R	1200	1.2	1.5	0.003	100				
1N2244A	S			R	1200	1.2	1.6	0.003	100				
1N2245	S			R	1200		5.0	0.003	100				
1N2245A	S			R	1200		5.0	0.003	100				
1N2246	S			R	50	1.2	3.0	0.005	200				
1N2246A	S			R	50	1.2	3.0	0.003	200				
1N2247	S			R	50		10	0.005	200				
1N2247A	S			R	50		10	0.003	200				
1N2248	S			R	100	1.2	3.0	0.005	200				
1N2248A	S			R	100	1.2	3.0	0.003	200				
1N2249	S			R	100		10	0.005	200				
1N2249A	S			R	100		10	0.003	200				
1N2250	S			R	200	1.2	3.0	0.005	200				
1N2250A	S			R	200	1.2	3.0	0.003	200				
1N2251	S			R	200		5.0	0.005	200				
1N2251A	S			R	200		10	0.003	200				
1N2252	S			R	300	1.2	3.0	0.005	200				
1N2252A	S			R	300	1.2	3.0	0.003	200				
1N2253	S			R	300		10	0.005	200				
1N2253A	S			R	300		10	0.003	200				
1N2254	S			R	400	1.2	3.0	0.005	200				
1N2254A	S			R	400	1.2	3.0	0.003	200				
1N2255	S			R	400		10	0.005	200				
1N2255A	S			R	400		10	0.003	200				
1N2256	S			R	500	1.2	3.0	0.005	200				
1N2256A	S			R	500	1.2	3.0	0.003	200				
1N2257	S			R	500		10	0.005	200				
1N2257A	S			R	500		10	0.005	200				
1N2258	S			R	600	1.2	3.0	0.005	200				
1N2258A	S			R	600	1.2	3.0	0.003	200				
1N2259	S			R	600		10	0.005	200				
1N2259A	S			R	600		10	0.003	200				
1N2260	S			R	800	1.2	3.0	0.003	200				
1N2260A	S			R	800	1.2	3.0	0.005	200				
1N2261	S			R	800		10	0.01	200				
1N2261A	S			R	800		10	0.005	200				
1N2262	S			R	1000	1.2	3.0	0.010	200				
1N2262A	S			R	1000	1.2	3.0	0.005	200				
1N2263	S			R	1000		10	0.01	200				
1N2263A	S			R	1000		10	0.005	200				
1N2264	S			R	1200	1.2	3.0	0.010	200				
1N2264A	S			R	1200	1.2	3.0	0.005	200				
1N2265	S			R	1200		10	0.01	200				
1N2265A	S			R	1200		10	0.005	200				
1N2266	S	MR1120	MR1120	R	50	1.2	0.3	0.003	20				
1N2267	S			R	50		1.0	0.003	20				
1N2268	S	MR1125	MR1120	R	500	1.2	0.3	0.003	20				
1N2269	S			R	500		1.0	0.003	20				
1N2270	S	MR1126	MR1120	R	600	1.2	0.3	0.003	20				
1N2271	S			R	600		1.0	0.003	20				
1N2272	S	MR1120	MR1120	R	50	1.2	6.0	1.0	400				
1N2273	S	MR1121	MR1120	R	100	1.2	6.0	1.0	400				
1N2274	S	MR1122	MR1120	R	200	1.2	6.0	1.0	400				
1N2275	S	MR1123	MR1120	R	300	1.2	6.0	1.0	400				
1N2276	S	MR1124	MR1120	R	400	1.2	6.0	1.0	400				
1N2277	S	MR1125	MR1120	R	500	1.2	6.0	1.0	400				
1N2278	S	MR1126	MR1120	R	600	1.2	6.0	1.0	400				
1N2279	S	MR1128	MR1120	R	800	1.2	6.0	1.0	400				
1N2280	S			R	1000	1.2	6.0	1.0	400				
1N2281	S			R	1200	1.2	6.0	1.0	400				
1N2282	S			R	300	1.5	20	5.0	400				
1N2283	S			R	400	1.5	20	5.0	400				
1N2284	S			R	500	1.5	20	5.0	400				
1N2285	S			R	600	1.5	20	5.0	400				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2286	S			R	800	1.5	20	5.0	400				
1N2287	S			R	1000	1.5	20	5.0	400				
1N2288	S			R	1200	1.5	20	5.0	400				
1N2289	S			R	100		1.5	0.003	20				
1N2289A	S			R	100		1.5	0.003	20				
1N2290	S			R	100		5.0	0.003	100				
1N2290A	S			R	100		5.0	0.003	100				
1N2291	S			R	200		1.5	0.003	20				
1N2291A	S			R	200		1.5	0.003	20				
1N2292	S			R	300		1.5	0.003	20				
1N2292A	S			R	300		1.5	0.003	20				
1N2293	S			R	400		1.5	0.003	20				
1N2293A	S			R	400		1.5	0.003	20				
1N2294	S			R	50	1.1	22	10	160				
1N2295	S			R	100	1.1	22	10	160				
1N2296	S			R	150	1.1	22	10	160				
1N2297	S			R	200	1.1	22	10	160				
1N2298	S			R	250	1.1	22	10	160				
1N2299	S			R	300	1.1	22	10	160				
1N2300	S			R	350	1.1	22	10	160				
1N2301	S			R	400	1.1	22	10	160				
1N2302	S			R	50	1.1	22	10	160				
1N2303	S			R	100	1.1	22	10	160				
1N2304	S			R	150	1.1	22	10	160				
1N2305	S			R	200	1.1	22	10	160				
1N2306	S			R	250	1.1	22	10	160				
1N2307	S			R	300	1.1	22	10	160				
1N2308	S			R	350	1.1	22	10	160				
1N2309	S			R	400	1.1	22	10	160				
1N2310	S			R	50	1.1	35	20	300				
1N2311	S			R	100	1.1	35	20	300				
1N2312	S			R	150	1.1	35	20	300				
1N2313	S			R	200	1.1	35	20	300				
1N2314	S			R	250	1.1	35	20	300				
1N2315	S			R	300	1.1	35	20	300				
1N2316	S			R	350	1.1	35	20	300				
1N2317	S			R	400	1.1	35	20	300				
1N2318	S			R	50	1.1	35	20	300				
1N2319	S			R	100	1.1	35	20	300				
1N2320	S			R	150	1.1	35	20	300				
1N2321	S			R	200	1.1	35	20	300				
1N2322	S			R	250	1.1	35	20	300				
1N2323	S			R	300	1.1	35	20	300				
1N2324	S			R	350	1.1	35	20	300				
1N2325	S			R	400	1.1	35	20	300				
1N2326	G			DS	1.0	0.150	2.0M	1.5*					
1N2327	S			DS	300	3.3	400M	1.5*					
1N2328	S			DS	300	3.3	400M	1.5*					
1N2348	S	MR1120	MR1120	R	50	1.1	3.0	0.3	15				
1N2349	S	MR1121	MR1120	R	100	1.1	3.0	0.3	15				
1N2350	S	MR1122	MR1120	R	150	1.1	3.0	0.3	15				
1N2357	S			R	1400		0.4	0.001	15				
1N2358	S			R	1500		0.4	0.001	15				
1N2359	S			R	1600		0.4	0.001	15				
1N2360	S			R	1800		0.4	0.001	15				
1N2361	S			R	2000		0.4	0.001	15				
1N2362	S			R	1400		1.0	0.001	15				
1N2362A	S			R	1400		5.0	0.001	20				
1N2362B	S			R	1400		10	0.001	25				
1N2363	S			R	1400		1.0	0.001	15				
1N2363A	S			R	1400		5.0	0.001	20				
1N2363B	S			R	1400		10	0.001	25				
1N2364	S			R	1500		1.0	0.001	15				
1N2364A	S			R	1500		5.0	0.001	20				
1N2364B	S			R	1500		10	0.001	25				
1N2365	S			R	1500		1.0	0.001	15				
1N2365A	S			R	1500		5.0	0.001	20				
1N2365B	S			R	1500		10	0.001	25				
1N2366	S			R	1600		1.0	0.001	15				
1N2366A	S			R	1600		5.0	0.001	20				
1N2366B	S			R	1600		10	0.001	25				
1N2367	S			R	1600		1.0	0.001	15				
1N2367A	S			R	1600		5.0	0.001	20				
1N2367B	S			R	1600		10	0.001	25				
1N2368	S			R	1800		1.0	0.001	15				
1N2368A	S			R	1800		5.0	0.001	20				
1N2368B	S			R	1800		10	0.001	25				
1N2369	S			R	1800		1.0	0.001	15				
1N2369A	S			R	1800		5.0	0.001	20				
1N2369B	S			R	1800		10	0.001	25				
1N2370	S			R	2000		1.0	0.001	15				
1N2370A	S			R	2000		5.0	0.001	20				



# IN2370B-1N2500

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @ I <sub>F</sub>	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2370B	S			R	2000		10	0.001	25				
1N2371	S			R	2000		1.0	0.001	15				
1N2371A	S			R	2000		5.0	0.001	20				
1N2371B	S			R	2000		10	0.001	25				
1N2372	S			R	1000	2.0	0.2	0.5	12				
1N2373	S	1N4005	1N4001	R	600	3.0	0.1	0.250	12				
1N2374	S	1N4007	1N4001	R	1000	3.0	0.1	0.250	12				
1N2375	S	MR991A	MR990A	R	1500	4.5	0.1	0.250	12				
1N2376	S	MR992A	MR990A	R	2000	7.5	0.1	0.250	12				
1N2377	S	MR993A	MR990A	R	2400	9.0	0.075	0.250	12				
1N2378	S	MR994A	MR990A	R	3000	9.0	0.075	0.250	12				
1N2379	S	MR995A	MR990A	R	4000	15.0	0.05	0.250	12				
1N2380	S	1N2383	1N1730	R	6000	22.5	0.05	0.250	12				
1N2381	S	1N2385	1N1730	R	10K	37.5	0.025	0.250	12				
1N2382	S		1N1730	R	4000	18	0.15	0.2	6.0				
1N2382A	S			R	4000	6.0	0.35	0.2	6.0				
1N2383	S		1N1730	R	6000	27	0.1	0.2	6.0				
1N2383A	S			R	6000	9.0	0.35	0.2	6.0				
1N2384	S		1N1730	R	8000	27	0.07	0.2	6.0				
1N2384A	S			R	8000	12	0.275	0.2	6.0				
1N2385	S			R	10K	39	0.07	0.2	6.0				
1N2385A	S			R	10K	15	0.2	0.2	6.0				
1N2386	G			DS	5.0								
1N2387	S	1N4751 *	1N4728	DZ						30	8.0	10	1.0W
1N2389	S			R	1600	4.8	0.6	0.5	15				
1N2390	S			R	50	1.2	1.5	0.3	35				
1N2391	S			R	100	1.2	1.5	0.3	35				
1N2392	S			R	200	1.2	1.5	0.3	35				
1N2393	S			R	300	1.2	1.5	0.3	35				
1N2394	S			R	400	1.2	1.5	0.3	35				
1N2395	S			R	500	1.2	1.5	0.3	35				
1N2396	S			R	600	1.2	1.5	0.3	35				
1N2397	S			R	700	1.2	1.5	0.3	35				
1N2398	S			R	800	1.2	1.5	0.3	35				
1N2399	S			R	50	1.2	1.5	0.3	35				
1N2400	S			R	100	1.2	1.5	0.3	35				
1N2401	S			R	200	1.2	1.5	0.3	35				
1N2402	S			R	300	1.2	1.5	0.3	35				
1N2403	S			R	400	1.2	1.5	0.3	35				
1N2404	S			R	500	1.2	1.5	0.3	35				
1N2405	S			R	600	1.2	1.5	0.3	35				
1N2406	S			R	700	1.2	1.5	0.3	35				
1N2407	S			R	800	1.2	1.5	0.3	35				
1N2408	S			R	50	1.2	1.5	0.3	35				
1N2409	S			R	100	1.2	1.5	0.3	35				
1N2410	S			R	200	1.2	1.5	0.3	35				
1N2411	S			R	300	1.2	1.5	0.3	35				
1N2412	S			R	400	1.2	1.5	0.3	35				
1N2413	S			R	500	1.2	1.5	0.3	35				
1N2414	S			R	600	1.2	1.5	0.3	35				
1N2415	S			R	700	1.2	1.5	0.3	35				
1N2416	S			R	800	1.2	1.5	0.3	35				
1N2417	S			R	50	1.2	1.5	0.3	35				
1N2418	S			R	100	1.2	1.5	0.3	35				
1N2419	S			R	200	1.2	1.5	0.3	35				
1N2420	S			R	300	1.2	1.5	0.3	35				
1N2421	S			R	400	1.2	1.5	0.3	35				
1N2422	S			R	500	1.2	1.5	0.3	35				
1N2423	S			R	600	1.2	1.5	0.3	35				
1N2424	S			R	700	1.2	1.5	0.3	35				
1N2425	S			R	800	1.2	1.5	0.3	35				
1N2482	S	1N4003	1N4001	R	200	1.2	0.75	0.5	30				
1N2483	S	1N4004	1N4001	R	400	1.2	0.75	0.5	30				
1N2484	S	1N4005	1N4001	R	500	1.2	0.75	0.5	30				
1N2485	S	1N4003	1N4001	R	200	1.2	0.75	0.5	30				
1N2486	S	1N4004	1N4001	R	300	1.2	0.75	0.5	30				
1N2487	S	1N4004	1N4001	R	400	1.2	0.75	0.5	30				
1N2488	S	1N4005	1N4001	R	500	1.2	0.75	0.5	30				
1N2489	S	1N4005	1N4001	R	600	1.2	0.75	0.5	30				
1N2490	S			R	1600	4.8	0.5	0.5	15				
1N2491	S	MR1120	MR1120	R	50	1.5	6.0	2.0	150				
1N2492	S	MR1121	MR1120	R	100	1.5	6.0	2.0	150				
1N2493	S	MR1122	MR1120	R	200	1.5	6.0	2.0	150				
1N2494	S	MR1123	MR1120	R	300	1.5	6.0	2.0	150				
1N2495	S	MR1124	MR1120	R	400	1.5	6.0	2.0	150				
1N2496	S	MR1125	MR1120	R	500	1.5	6.0	2.0	150				
1N2497	S	MR1126	MR1120	R	600	1.5	6.0	2.0	150				
1N2498	S	1N2974A *	1N2970	DZ						10	500	10	10W
1N2498A	S	1N2974B *	1N2970	DZ						10	500	5.0	10W
1N2499	S	1N2975A *	1N2970	DZ						11	500	10	10W
1N2499A	S	1N2975B *	1N2970	DZ						11	500	5.0	10W
1N2500	S	1N2976A *	1N2970	DZ						12	500	10	10W

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> %	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2500A	S	1N2976B *	1N2970	DZ						12	500	5.0	10W
1N2501	S	1N4006	1N4001	R	800	1.7	0.15	0.2	2.5				
1N2502	S	1N4007	1N4001	R	1000	1.7	0.15	0.2	2.5				
1N2503	S			R	1200	1.7	0.15	0.2	2.5				
1N2504	S			R	1500	1.7	0.15	0.2	2.5				
1N2505	S	1N4006	1N4001	R	800	1.7	0.3	0.2	2.5				
1N2506	S	1N4006	1N4001	R	1000	1.7	0.3	0.2	2.5				
1N2507	S			R	1200	1.7	0.3	0.2	2.5				
1N2508	S			R	1500	1.7	0.3	0.2	2.5				
1N2509	S	Microwave C-band Mixer; NF = 10 dB											
1N2510	S	Microwave X-band Mixer; NF = 9.5 dB											
1N2512	S			R	100	1.1		0.002	30				
1N2513	S			R	200	1.1		0.002	30				
1N2514	S			R	300	1.1		0.002	30				
1N2515	S			R	400	1.1		0.002	30				
1N2516	S			R	500	1.1		0.002	30				
1N2517	S			R	600	1.1		0.002	30				
1N2518	S			R	100	1.1		0.002	30				
1N2519	S			R	200	1.1		0.002	30				
1N2520	S			R	300	1.1		0.002	30				
1N2521	S			R	400	1.1		0.002	30				
1N2522	S			R	500	1.1		0.002	30				
1N2523	S			R	600	1.1		0.002	30				
1N2524	S			R	50	1.2	2.5	0.5	50				
1N2525	S			R	100	1.2	2.5	0.5	50				
1N2526	S			R	200	1.2	2.5	0.5	50				
1N2527	S			R	300	1.2	2.5	0.5	50				
1N2528	S			R	400	1.2	2.5	0.5	50				
1N2529	S			R	500	1.2	2.5	0.5	50				
1N2530	S			R	600	1.2	2.5	0.5	50				
1N2531	S			R	700	1.2	2.5	0.5	50				
1N2532	S			R	800	1.2	2.5	0.5	50				
1N2533	S			R	900	1.2	2.5	0.5	50				
1N2534	S			R	1000	1.2	2.5	0.5	50				
1N2535	S			R	50	1.0	2.5	0.1	50				
1N2536	S			R	100	1.0	2.5	0.1	50				
1N2537	S			R	200	1.0	2.5	0.1	50				
1N2538	S			R	300	1.0	2.5	0.1	50				
1N2539	S			R	400	1.0	2.5	0.1	50				
1N2540	S			R	500	1.0	2.5	0.1	50				
1N2541	S			R	600	1.0	2.5	0.1	50				
1N2542	S			R	700	1.0	2.5	0.1	50				
1N2543	S			R	800	1.0	2.5	0.1	50				
1N2544	S			R	900	1.0	2.5	0.1	50				
1N2545	S			R	1000	1.0	2.5	0.1	50				
1N2546	S			R	50	1.5	2.5	1.0	50				
1N2547	S			R	100	1.5	2.5	1.0	50				
1N2548	S			R	200	1.5	2.5	1.0	50				
1N2549	S			R	300	1.5	2.5	1.0	50				
1N2550	S			R	400	1.5	2.5	1.0	50				
1N2551	S			R	500	1.5	2.5	1.0	50				
1N2552	S			R	600	1.5	2.5	1.0	50				
1N2553	S			R	700	1.5	2.5	1.0	50				
1N2554	S			R	800	1.5	2.5	1.0	50				
1N2555	S			R	900	1.5	2.5	1.0	50				
1N2556	S			R	1000	1.5	2.5	1.0	50				
1N2557	S			R	700	1.2	6.0	0.5	150				
1N2558	S			R	800	1.2	6.0	0.5	150				
1N2559	S			R	900	1.2	6.0	0.5	150				
1N2560	S			R	1000	1.2	6.0	0.5	150				
1N2561	S			R	700	1.0	6.0	0.1	150				
1N2562	S			R	800	1.0	6.0	0.1	150				
1N2563	S			R	900	1.0	6.0	0.1	150				
1N2564	S			R	1000	1.0	6.0	0.1	150				
1N2565	S			R	50	1.5	6.0	1.0	150				
1N2566	S			R	100	1.5	6.0	1.0	150				
1N2567	S			R	200	1.5	6.0	1.0	150				
1N2568	S			R	300	1.5	6.0	1.0	150				
1N2569	S			R	400	1.5	6.0	1.0	150				
1N2570	S			R	500	1.5	6.0	1.0	150				
1N2571	S			R	600	1.5	6.0	1.0	150				
1N2572	S			R	700	1.5	6.0	1.0	150				
1N2573	S			R	800	1.5	6.0	1.0	150				
1N2574	S			R	900	1.5	6.0	1.0	150				
1N2575	S			R	1000	1.5	6.0	1.0	150				
1N2576	S			R	50	1.2	12	1.0	250				
1N2577	S			R	100	1.2	12	1.0	250				
1N2578	S			R	200	1.2	12	1.0	250				
1N2579	S			R	300	1.2	12	1.0	250				
1N2580	S			R	400	1.2	12	1.0	250				
1N2581	S			R	500	1.2	12	1.0	250				
1N2582	S			R	600	1.2	12	1.0	250				

Replacement \* denotes exact device type replacement available on request.



**1N2585-1N2667**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts)	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2583	S			R	700	1.2	12	1.0	250				
1N2584	S			R	800	1.2	12	1.0	250				
1N2585	S			R	900	1.2	12	1.0	250				
1N2586	S			R	1000	1.2	12	1.0	250				
1N2587	S			R	50	1.0	12	0.2	250				
1N2588	S			R	100	1.0	12	0.2	250				
1N2589	S			R	200	1.0	12	0.2	250				
1N2590	S			R	300	1.0	12	0.2	250				
1N2591	S			R	400	1.0	12	0.2	250				
1N2592	S			R	500	1.0	12	0.2	250				
1N2593	S			R	600	1.0	12	0.2	250				
1N2594	S			R	700	1.0	12	0.2	250				
1N2595	S			R	800	1.0	12	0.2	250				
1N2596	S			R	900	1.0	12	0.2	250				
1N2597	S			R	1000	1.0	12	0.2	250				
1N2598	S			R	50	1.5	12	2.0	250				
1N2599	S			R	100	1.5	12	2.0	250				
1N2600	S			R	200	1.5	12	2.0	250				
1N2601	S			R	300	1.5	12	2.0	250				
1N2602	S			R	400	1.5	12	2.0	250				
1N2603	S			R	500	1.5	12	2.0	250				
1N2604	S			R	600	1.5	12	2.0	250				
1N2605	S			R	700	1.5	12	2.0	250				
1N2606	S			R	800	1.5	12	2.0	250				
1N2607	S			R	900	1.5	12	2.0	250				
1N2608	S			R	1000	1.5	12	2.0	250				
1N2609	S	1N4001	1N4001	R	50	1.1	0.75	0.3	30				
1N2610	S	1N4002	1N4001	R	100	1.1	0.75	0.3	30				
1N2611	S	1N4003	1N4001	R	200	1.1	0.75	0.3	30				
1N2612	S	1N4004	1N4001	R	300	1.1	0.75	0.3	30				
1N2613	S	1N4004	1N4001	R	400	1.1	0.75	0.3	30				
1N2614	S	1N4005	1N4001	R	500	1.1	0.75	0.3	30				
1N2615	S	1N4005	1N4001	R	600	1.1	0.75	0.3	30				
1N2616	S	1N4006	1N4001	R	800	1.1	0.75	0.3	30				
1N2617	S	1N4007	1N4001	R	1000	1.1	0.75	0.3	30				
1N2618	S			R	1200	1.1	0.75	0.3	30				
1N2619	S		1N2620	R	1500	1.1	0.75	0.3	30	9.7	0.01	10	0/75
1N2620	S		1N2620	DR						9.7	0.01	10	-55/100
1N2620A	S		1N2620	DR						9.7	0.01	10	-55/150
1N2620B	S		1N2620	DR						9.7	0.005	10	0/75
1N2621	S		1N2620	DR						9.7	0.005	10	-55/100
1N2621A	S		1N2620	DR						9.7	0.005	10	-55/150
1N2621B	S		1N2620	DR						9.7	0.005	10	0/75
1N2622	S		1N2620	DR						9.7	0.002	10	-55/100
1N2622A	S		1N2620	DR						9.7	0.002	10	-55/150
1N2622B	S		1N2620	DR						9.7	0.002	10	0/75
1N2623	S		1N2620	DR						9.7	0.001	10	-55/100
1N2623A	S		1N2620	DR						9.7	0.001	10	-55/150
1N2623B	S		1N2620	DR						9.7	0.001	10	-55/150
1N2624	S		1N2620	DR						9.7	0.0005	10	0/75
1N2624A	S		1N2620	DR						9.7	0.0005	10	-55/100
1N2624B	S		1N2620	DR						9.7	0.0005	10	-55/150
1N2625	S	1N937	1N935	DR						9.7	0.0002	10	0/75
1N2625A	S	1N937A	1N935	DR						9.4	0.0002	10	-55/100
1N2625B	S	1N937B	1N935	DR						9.4	0.0002	10	-55/150
1N2626	S	1N938	1N935	DR						9.4	0.0001	10	0/75
1N2626A	S	1N938A	1N935	DR						9.4	0.0001	10	-55/100
1N2626B	S	1N938B	1N935	DR						9.4	0.0001	10	-55/150
1N2627		Varactor Diodes, see Table on Page 1-100											
1N2628													
1N2629	G			DS	5.0								
1N2630	S			R	1500	2.25	0.085	0.5	5.0				
1N2631	S			R	1600	3.0	0.6	0.5	5.0				
1N2632	S			R	2800	6.0	0.2	0.5	5.0				
1N2633	S			R	1600	3.0	0.6	0.5	5.0				
1N2634	S			R	1600	3.0	0.6	0.5	5.0				
1N2635	S			R	1500	2.25	0.085	0.5	5.0				
1N2636	S			R	1500	2.25	0.085	0.5	5.0				
1N2637	S			R		28.0	0.25	0.5	5.0				
1N2638	S			R	100	1.3	1.5	0.3	15				
1N2641	S			R	200	1.3	1.5	0.3	15				
1N2644	S			R	300	1.3	1.5	0.3	15				
1N2647	S			R	400	1.3	1.5	0.3	15				
1N2650	S			R	600	2.6	1.5	0.3	15				
1N2653	S			R	800	2.6	1.5	0.3	15				
1N2656	S			R	1200	3.9	1.5	0.8	15				
1N2659	S			R	1600	5.2	1.5	0.8	15				
1N2662	S			R	2000	6.5	1.5	0.8	15				
1N2664	S			R	2400	7.8	1.5	0.8	15				
1N2666	S			R	3200	10.4	1.5	0.8	15				
1N2667	S			R	4000	13	1.5	0.8	15				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2668	S			R	4800	15.6	1.5	0.8	15				
1N2669	S			R	100	1.3	3.6	0.3	15				
1N2673	S			R	200	1.3	3.6	0.3	15				
1N2677	S			R	300	1.3	3.6	0.3	15				
1N2681	S			R	400	1.3	3.6	0.3	15				
1N2685	S			R	600	2.6	3.6	0.3	15				
1N2687	S			R	800	2.6	3.6	0.3	15				
1N2689	S			R	900	3.9	3.6	0.8	15				
1N2690	S			R	1200	3.9	3.6	0.8	15				
1N2691	S			R	1600	5.2	3.6	0.8	15				
1N2692	S			R	100	1.3	7.2	0.3	15				
1N2694	S			R	200	1.3	7.2	0.3	15				
1N2696	S			R	300	1.3	7.2	0.3	15				
1N2698	S			R	400	1.3	7.2	0.3	15				
1N2700	S			R	600	2.6	7.2	0.3	15				
1N2701	S			R	800	2.6	7.2	0.3	15				
1N2702	S			R	100	1.3	3.0	0.2	15				
1N2705	S			R	200	1.3	3.0	0.2	15				
1N2708	S			R	300	1.3	3.0	0.2	15				
1N2711	S			R	400	1.3	3.0	0.2	15				
1N2714	S			R	600	2.6	3.0	0.2	15				
1N2717	S			R	800	2.6	3.0	0.2	15				
1N2720	S			R	1200	3.9	3.0	0.8	15				
1N2722	S			R	1600	5.2	3.0	0.8	15				
1N2723	S			R	2000	6.5	3.0	0.8	15				
1N2724	S			R	2400	7.8	3.0	0.8	15				
1N2725	S			R	100	1.3	3.0	0.3	15				
1N2728	S			R	200	1.3	3.0	0.3	15				
1N2731	S			R	300	1.3	3.0	0.3	15				
1N2734	S			R	400	1.3	3.0	0.3	15				
1N2737	S			R	600	2.6	3.0	0.3	15				
1N2738	S			R	800	2.6	3.0	0.3	15				
1N2739	S			R	1200	3.9	3.0	0.8	15				
1N2740	S			R	100	1.3	3.6	0.3	15				
1N2742	S			R	200	1.3	3.6	0.3	15				
1N2744	S			R	300	1.3	3.6	0.3	15				
1N2746	S			R	400	1.3	3.6	0.3	15				
1N2748	S			R	600	2.6	3.6	0.3	15				
1N2749	S			R	800	2.6	3.6	0.3	15				
1N2750	S			R	100	1.3	3.0	0.3	15				
1N2753	S			R	200	1.3	3.0	0.3	15				
1N2756	S			R	300	1.3	3.0	0.3	15				
1N2759	S			R	400	1.3	3.0	0.3	15				
1N2762	S			R	600	2.6	3.0	0.3	15				
1N2763	S			R	800	2.6	3.0	0.3	15				
1N2764	S			R	1200	3.9	3.0	0.8	15				
1N2765	S	1N823A	1N821	DR						6.8	0.005	7.5	-55/100
1N2765A	S	1N825A	1N821	DR						6.8	0.0025	7.5	-55/100
1N2766	S	1N1736A	1N429	DR						13.6	0.005	7.5	-55/100
1N2766A	S	1N1736A	1N429	DR						13.6	0.0025	7.5	-55/100
1N2767	S	1N4061	1N429	DR						20.4	0.005	7.5	-55/100
1N2767A	S	1N4061A	1N429	DR						20.4	0.0025	7.5	-55/100
1N2768	S	1N4063	1N429	DR						27.2	0.005	7.5	-55/100
1N2768A	S	1N4063A	1N429	DR						27.2	0.0025	7.5	-55/100
1N2769	S	1N4065	1N429	DR						34.0	0.005	7.5	-55/100
1N2769A	S	1N4065A	1N429	DR						34.0	0.0025	7.5	-55/100
1N2770	S	1N4067	1N429	DR						40.8	0.005	7.5	-55/100
1N2770A	S	1N4067A	1N429	DR						40.8	0.0025	7.5	-55/100
1N2772	S			R	700	1.8	0.5		15				
1N2773	S			R	800	1.8	0.5		15				
1N2774	S			R	900	1.8	0.5		15				
1N2775	S			R	1000	1.8	0.5		15				
1N2776	S			R	1100	1.8	0.5		15				
1N2777	S			R	1200	1.8	0.5		15				
1N2778	S			R	1300	1.8	0.5		15				
1N2779	S			R	1400	1.8	0.5		15				
1N2780	S			R	1500	1.8	0.5		15				
1N2781	S			R	1600	1.8	0.5		15				
1N2782	S			DS	5.0			2.0*					
1N2783	S	1N3000A	1N2970	DZ						62		10	6.0W
1N2784	S			R	200	1.5	8.0	5.0	200				
1N2785	S			R	400	1.5	8.0	5.0	200				
1N2786	S			R	200	1.2	10	10.0	180				
1N2787	S			R	400	1.2	10	10.0	180				
1N2788	S			R	200	1.3	12.5	5.0	340				
1N2789	S			R	400	1.3	12.5	5.0	340				
1N2790	S	1N3156	1N3154	DR						8.5	0.002	10	-55/100
1N2791	S			DS		1.3	50M	0.05*	4.0				
1N2793	S	1N1183	1N1183	R	50	1.25	5.0	5.0	75				



# 1N2794-1N2827B

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N2794	S	1N1184	1N1183	R	100	1.25	5.0	5.0	75				
1N2795	S	1N1185	1N1183	R	150	1.25	5.0	5.0	75				
1N2796	S	1N1186	1N1183	R	200	1.25	5.0	5.0	75				
1N2797	S	1N1187	1N1183	R	250	1.25	5.0	5.0	75				
1N2798	S	1N1187	1N1183	R	300	1.25	5.0	5.0	75				
1N2799	S	1N1188	1N1183	R	350	1.25	5.0	5.0	75				
1N2800	S	1N1188	1N1183	R	400	1.25	5.0	5.0	75				
1N2801	G			DS	20	0.36	5.0M	2.0*	500				
1N2802		Microwave X-band Mixer;			NF = 7.5 dB								
1N2803	S				400	1.2	250	36	3500				
1N2804	S		1N2804	DZ						6.8	1850	20	50W
1N2804A	S		1N2804	DZ						6.8	1850	10	50W
1N2804B	S		1N2804	DZ						6.8	1850	5.0	50W
1N2805	S		1N2804	DZ						7.5	1700	20	50W
1N2805A	S		1N2804	DZ						7.5	1700	10	50W
1N2805B	S		1N2804	DZ						7.5	1700	5.0	50W
1N2806	S		1N2804	DZ						8.2	1500	20	50W
1N2806A	S		1N2804	DZ						8.2	1500	10	50W
1N2806B	S		1N2804	DZ						8.2	1500	5.0	50W
1N2807	S		1N2804	DZ						9.1	1370	20	50W
1N2807A	S		1N2804	DZ						9.1	1370	10	50W
1N2807B	S		1N2804	DZ						9.1	1370	5.0	50W
1N2808	S		1N2804	DZ						10	1200	20	50W
1N2808A	S		1N2804	DZ						10	1200	10	50W
1N2808B	S		1N2804	DZ						10	1200	5.0	50W
1N2809	S		1N2804	DZ						11	1100	20	50W
1N2809A	S		1N2804	DZ						11	1100	10	50W
1N2809B	S		1N2804	DZ						11	1100	5.0	50W
1N2810	S		1N2804	DZ						12	1000	20	50W
1N2810A	S		1N2804	DZ						12	1000	10	50W
1N2810B	S		1N2804	DZ						12	1000	5.0	50W
1N2811	S		1N2804	DZ						13	960	20	50W
1N2811A	S		1N2804	DZ						13	960	10	50W
1N2811B	S		1N2804	DZ						13	960	5.0	50W
1N2812	S		1N2804	DZ						14	890	20	50W
1N2812A	S		1N2804	DZ						14	890	10	50W
1N2812B	S		1N2804	DZ						14	890	5.0	50W
1N2813	S		1N2804	DZ						15	830	20	50W
1N2813A	S		1N2804	DZ						15	830	10	50W
1N2813B	S		1N2804	DZ						15	830	5.0	50W
1N2814	S		1N2804	DZ						16	780	20	50W
1N2814A	S		1N2804	DZ						16	780	10	50W
1N2814B	S		1N2804	DZ						16	780	5.0	50W
1N2815	S		1N2804	DZ						17	740	20	50W
1N2815A	S		1N2804	DZ						17	740	10	50W
1N2815B	S		1N2804	DZ						17	740	5.0	50W
1N2816	S		1N2804	DZ						18	700	20	50W
1N2816A	S		1N2804	DZ						18	700	10	50W
1N2816B	S		1N2804	DZ						18	700	5.0	50W
1N2817	S		1N2804	DZ						19	660	20	50W
1N2817A	S		1N2804	DZ						19	660	10	50W
1N2817B	S		1N2804	DZ						19	660	5.0	50W
1N2818	S		1N2804	DZ						20	630	20	50W
1N2818A	S		1N2804	DZ						20	630	10	50W
1N2818B	S		1N2804	DZ						20	630	5.0	50W
1N2819	S		1N2804	DZ						22	570	20	50W
1N2819A	S		1N2804	DZ						22	570	10	50W
1N2819B	S		1N2804	DZ						22	570	5.0	50W
1N2820	S		1N2804	DZ						24	520	20	50W
1N2820A	S		1N2804	DZ						24	520	10	50W
1N2820B	S		1N2804	DZ						24	520	5.0	50W
1N2821	S		1N2804	DZ						25	500	20	50W
1N2821A	S		1N2804	DZ						25	500	10	50W
1N2821B	S		1N2804	DZ						25	500	5.0	50W
1N2822	S		1N2804	DZ						27	460	20	50W
1N2822A	S		1N2804	DZ						27	460	10	50W
1N2822B	S		1N2804	DZ						27	460	5.0	50W
1N2823	S		1N2804	DZ						30	420	20	50W
1N2823A	S		1N2804	DZ						30	420	10	50W
1N2823B	S		1N2804	DZ						30	420	5.0	50W
1N2824	S		1N2804	DZ						33	380	20	50W
1N2824A	S		1N2804	DZ						33	380	10	50W
1N2824B	S		1N2804	DZ						33	380	5.0	50W
1N2825	S		1N2804	DZ						36	350	20	50W
1N2825A	S		1N2804	DZ						36	350	10	50W
1N2825B	S		1N2804	DZ						36	350	5.0	50W
1N2826	S		1N2804	DZ						39	320	20	50W
1N2826A	S		1N2804	DZ						39	320	10	50W
1N2826B	S		1N2804	DZ						39	320	5.0	50W
1N2827	S		1N2804	DZ						43	290	20	50W
1N2827A	S		1N2804	DZ						43	290	10	50W
1N2827B	S		1N2804	DZ						43	290	5.0	50W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES				$t_{rr}$ ( $\mu$ s)	REFERENCE DIODES			
					PRV (volts)	$V_F$ @ (volts)	$I_F$	$I_R$		$V_Z$ (nom)	$T_C$ °C	$I_{ZT}$ mA	Temp Range
1N2828	S		1N2804	DZ						45	280	20	50W
1N2828A	S		1N2804	DZ						45	280	10	50W
1N2828B	S		1N2804	DZ						45	280	5.0	50W
1N2829	S		1N2804	DZ						47	270	20	50W
1N2829A	S		1N2804	DZ						47	270	10	50W
1N2829B	S		1N2804	DZ						47	270	5.0	50W
1N2830	S		1N2804	DZ						50	250	20	50W
1N2830A	S		1N2804	DZ						50	250	10	50W
1N2830B	S		1N2804	DZ						50	250	5.0	50W
1N2831	S		1N2804	DZ						51	245	20	50W
1N2831A	S		1N2804	DZ						51	245	10	50W
1N2831B	S		1N2804	DZ						51	245	5.0	50W
1N2832	S		1N2804	DZ						56	220	20	50W
1N2832A	S		1N2804	DZ						56	220	10	50W
1N2832B	S		1N2804	DZ						56	220	5.0	50W
1N2833	S		1N2804	DZ						62	200	20	50W
1N2833A	S		1N2804	DZ						62	200	10	50W
1N2833B	S		1N2804	DZ						62	200	5.0	50W
1N2834	S		1N2804	DZ						68	180	20	50W
1N2834A	S		1N2804	DZ						68	180	10	50W
1N2834B	S		1N2804	DZ						68	180	5.0	50W
1N2835	S		1N2804	DZ						75	170	20	50W
1N2835A	S		1N2804	DZ						75	170	10	50W
1N2835B	S		1N2804	DZ						75	170	5.0	50W
1N2836	S		1N2804	DZ						82	150	20	50W
1N2836A	S		1N2804	DZ						82	150	10	50W
1N2836B	S		1N2804	DZ						82	150	5.0	50W
1N2837	S		1N2804	DZ						91	140	20	50W
1N2837A	S		1N2804	DZ						91	140	10	50W
1N2837B	S		1N2804	DZ						91	140	5.0	50W
1N2838	S		1N2804	DZ						100	120	20	50W
1N2838A	S		1N2804	DZ						100	120	10	50W
1N2838B	S		1N2804	DZ						100	120	5.0	50W
1N2839	S		1N2804	DZ						105	120	20	50W
1N2839A	S		1N2804	DZ						105	120	10	50W
1N2839B	S		1N2804	DZ						105	120	5.0	50W
1N2840	S		1N2804	DZ						110	110	20	50W
1N2840A	S		1N2804	DZ						110	110	10	50W
1N2840B	S		1N2804	DZ						110	110	5.0	50W
1N2841	S		1N2804	DZ						120	100	20	50W
1N2841A	S		1N2804	DZ						120	100	10	50W
1N2841B	S		1N2804	DZ						120	100	5.0	50W
1N2842	S		1N2804	DZ						130	95	20	50W
1N2842A	S		1N2804	DZ						130	95	10	50W
1N2842B	S		1N2804	DZ						130	95	5.0	50W
1N2843	S		1N2804	DZ						140	90	20	50W
1N2843A	S		1N2804	DZ						140	90	10	50W
1N2843B	S		1N2804	DZ						140	90	5.0	50W
1N2844	S		1N2804	DZ						160	80	20	50W
1N2844A	S		1N2804	DZ						160	80	10	50W
1N2844B	S		1N2804	DZ						160	80	5.0	50W
1N2845	S		1N2804	DZ						180	68	20	50W
1N2845A	S		1N2804	DZ						180	68	10	50W
1N2845B	S		1N2804	DZ						180	68	5.0	50W
1N2846	S		1N2804	DZ						200	65	20	50W
1N2846A	S		1N2804	DZ						200	65	10	50W
1N2846B	S		1N2804	DZ						200	65	5.0	50W
1N2847	S		R	R	100	2.0	1.5	0.3	15				
1N2848	S		R	R	200	2.0	1.5	0.2	15				
1N2849	S		R	R	300	2.0	1.5	0.2	15				
1N2850	S		R	R	400	2.0	1.5	0.2	15				
1N2851	S		R	R	500	2.0	1.5	0.2	15				
1N2852	S		R	R	600	2.0	1.5	0.2	15				
1N2855	S		R	R	600	1.2	250	25	3500				
1N2856	S		R	R	800	1.2	250	25	4500				
1N2857	S		R	R	1000	1.2	250	15	4500				
1N2858	S	1N4001	R	R	50	1.2	0.75	0.3	40				
1N2858A	S		R	R	50	1.2	1.0	0.3	25				
1N2859	S	1N4002	R	R	100	1.2	0.75	0.3	40				
1N2859A	S		R	R	100	1.2	1.0	0.3	25				
1N2860	S	1N4003	R	R	200	1.2	0.75	0.3	40				
1N2860A	S		R	R	200	1.2	1.0	0.3	25				
1N2861	S	1N4004	R	R	300	1.2	0.75	0.2	40				
1N2861A	S		R	R	300	1.2	1.0	0.3	25				
1N2862	S	1N4004	R	R	400	1.2	0.75	0.2	40				
1N2862A	S		R	R	400	1.2	1.0	0.3	25				
1N2863	S	1N4005	R	R	500	1.2	0.75	0.2	40				
1N2863A	S		R	R	500	1.2	1.0	0.3	25				
1N2864	S	1N4005	R	R	600	1.2	0.75	0.2	40				
1N2864A	S		R	R	600	1.2	1.0	0.3	25				
1N2865	S		R	R	1000	2.5	0.7	0.1	7.0				
1N2866	S		R	R	1500	2.5	0.7	0.1	7.0				



# 1N2867-1N2976A

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N2867	S			R	1000	2.5	0.7	0.1	7.0				
1N2868	S			R	1500	2.5	0.7	0.1	7.0				
1N2878	S	1N4006	1N4001	DS	700	2.0	250M	0.5*					
1N2879	S	1N4006	1N4001	DS	700	2.0	250M	0.5*					
1N2880	S	1N4007	1N4001	DS	1.0K	2.0	250M	0.5*					
1N2881	S	1N4007	1N4001	DS	1.0K	2.0	250M	0.5*					
1N2882	S	1N4007	1N4001	DS	500	3.0	250M	0.5*					
1N2883	S	1N4007	1N4001	DS	500	3.0	250M	0.5*					
1N2884	S	MR991A	MR990A	DS	400	4.0	250M	0.5*					
1N2885	S	MR991A	MR990A	DS	400	4.0	250M	0.5*					
1N2886	S	MR991A	MR990A	DS	500	3.0	250M	0.5*					
1N2887	S	MR991A	MR990A	DS	500	3.0	250M	0.5*					
1N2888	S			DS	750	5.0	250M	0.5*					
1N2889	S	MR992A	MR990A	DS	750	5.0	250M	0.5*					
1N2890	S	MR992A	MR990A	DS	2.0K	4.0	250M	0.5*					
1N2891	S	MR992A	MR990A	DS	2.0K	4.0	250M	0.5*					
1N2892	S	MR993A	MR990A	DS	100	6.0	250M	0.5*					
1N2893	S	MR993A	MR990A	DS	100	6.0	250M	0.5*					
1N2894	S	MR994A	MR990A	DS	450	7.0	250M	0.5*					
1N2895	S	MR994A	MR990A	DS	450	7.0	250M	0.5*					
1N2896	S	MR994A	MR990A	DS	500	5.0	250M	0.5*					
1N2897	S	MR994A	MR990A	DS	500	5.0	250M	0.5*					
1N2898	S	MR995A	MR990A	DS	800	8.0	250M	0.5*					
1N2899	S	MR995A	MR990A	DS	800	8.0	250M	0.5*					
1N2900	S	MR995A	MR990A	DS	3.0K	6.0	250M	0.5*					
1N2901	S	MR995A	MR990A	DS	3.0K	6.0	250M	0.5*					
1N2902	S			DS	150	9.0	250M	0.5*					
1N2903	S			DS	150	9.0	250M	0.5*					
1N2904	S			DS	500	7.0	250M	0.5*					
1N2905	S			DS	500	7.0	250M	0.5*					
1N2906	S			DS	500	10	250M	0.5*					
1N2907	S			DS	500	10	250M	0.5*					
1N2908	S			DS	850	11	250M	0.5*					
1N2909	S			DS	850	11	250M	0.5*					
1N2910	S			DS	4.0K	8.0	250M	0.5*					
1N2911	S			DS	4.0K	8.0	250M	0.5*					
1N2912	S			DS	200	12	250M	0.5*					
1N2913	S			DS	200	12	250M	0.5*					
1N2914	S			DS	500	9.0	250M	0.5*					
1N2915	S			DS	500	9.0	250M	0.5*					
1N2916	S			DS	550	13	250M	0.5*					
1N2917	S			DS	550	13	250M	0.5*					
1N2918	S			DS	5.0K	10	250M	0.5*					
1N2919	S			DS	5.0K	10	250M	0.5*					
1N2920	S			DS	500	11	250M	0.5*					
1N2921	S			DS	500	11	250M	0.5*					
1N2922	S			DS	6.0K	12	250M	0.5*					
1N2923	S			DS	6.0K	12	250M	0.5*					
1N2924	S			DS	500	13	250M	0.5*					
1N2925	S			DS	500	13	250M	0.5*					
1N2926		Microwave X-K band Detector	Detector										
1N2926A													
1N2927,A thru 1N2934,A	S	Tunnel Diodes											
1N2937	S	1N2996A	1N2970	DZ						45	25	5.0	10W
1N2938	S			DZ						0.9	100	15	2.0W
1N2939,A thru 1N2941,A	G	Tunnel Diodes											
1N2969	G	Tunnel Diode	Tunnel Diode										
1N2969A	G												
1N2970	S		1N2970	DZ						6.8	370	20	10W
1N2970A	S		1N2970	DZ						6.8	370	10	10W
1N2970B	S		1N2970	DZ						6.8	370	5.0	10W
1N2971	S		1N2970	DZ						7.5	335	20	10W
1N2971A	S		1N2970	DZ						7.5	335	10	10W
1N2971B	S		1N2970	DZ						7.5	335	5.0	10W
1N2972	S		1N2970	DZ						8.2	305	20	10W
1N2972A	S		1N2970	DZ						8.2	305	10	10W
1N2972B	S		1N2970	DZ						8.2	305	5.0	10W
1N2973	S		1N2970	DZ						9.1	275	20	10W
1N2973A	S		1N2970	DZ						9.1	275	10	10W
1N2973B	S		1N2970	DZ						9.1	275	5.0	10W
1N2974	S		1N2970	DZ						10	250	20	10W
1N2974A	S		1N2970	DZ						10	250	10	10W
1N2974B	S		1N2970	DZ						10	250	5.0	10W
1N2975	S		1N2970	DZ						11	230	20	10W
1N2975A	S		1N2970	DZ						11	230	10	10W
1N2975B	S		1N2970	DZ						11	230	5.0	10W
1N2976	S		1N2970	DZ						12	210	20	10W
1N2976A	S		1N2970	DZ						12	210	10	10W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °/°C	I <sub>ZT</sub> mA	Temp Range
1N2976B	S		1N2970	DZ						12	210	5.0	10W
1N2977	S		1N2970	DZ						13	190	20	10W
1N2977A	S		1N2970	DZ						13	190	10	10W
1N2977B	S		1N2970	DZ						13	190	5.0	10W
1N2978	S		1N2970	DZ						14	180	20	10W
1N2978A	S		1N2970	DZ						14	180	10	10W
1N2978B	S		1N2970	DZ						14	180	5.0	10W
1N2979	S		1N2970	DZ						15	170	20	10W
1N2979A	S		1N2970	DZ						15	170	10	10W
1N2979B	S		1N2970	DZ						15	170	5.0	10W
1N2980	S		1N2970	DZ						16	155	20	10W
1N2980A	S		1N2970	DZ						16	155	10	10W
1N2980B	S		1N2970	DZ						16	155	5.0	10W
1N2981	S		1N2970	DZ						17	145	20	10W
1N2981A	S		1N2970	DZ						17	145	10	10W
1N2981B	S		1N2970	DZ						17	145	5.0	10W
1N2982	S		1N2970	DZ						18	140	20	10W
1N2982A	S		1N2970	DZ						18	140	10	10W
1N2982B	S		1N2970	DZ						18	140	5.0	10W
1N2983	S		1N2970	DZ						19	130	20	10W
1N2983A	S		1N2970	DZ						19	130	10	10W
1N2983B	S		1N2970	DZ						19	130	5.0	10W
1N2984	S		1N2970	DZ						20	125	20	10W
1N2984A	S		1N2970	DZ						20	125	10	10W
1N2984B	S		1N2970	DZ						20	125	5.0	10W
1N2985	S		1N2970	DZ						22	115	20	10W
1N2985A	S		1N2970	DZ						22	115	10	10W
1N2985B	S		1N2970	DZ						22	115	5.0	10W
1N2986	S		1N2970	DZ						24	105	20	10W
1N2986A	S		1N2970	DZ						24	105	10	10W
1N2986B	S		1N2970	DZ						24	105	5.0	10W
1N2987	S		1N2970	DZ						25	100	20	10W
1N2987A	S		1N2970	DZ						25	100	10	10W
1N2987B	S		1N2970	DZ						25	100	5.0	10W
1N2988	S		1N2970	DZ						27	95	20	10W
1N2988A	S		1N2970	DZ						27	95	10	10W
1N2988B	S		1N2970	DZ						27	95	5.0	10W
1N2989	S		1N2970	DZ						30	85	20	10W
1N2989A	S		1N2970	DZ						30	85	10	10W
1N2989B	S		1N2970	DZ						30	85	5.0	10W
1N2990	S		1N2970	DZ						33	75	20	10W
1N2990A	S		1N2970	DZ						33	75	10	10W
1N2990B	S		1N2970	DZ						33	75	5.0	10W
1N2991	S		1N2970	DZ						36	70	20	10W
1N2991A	S		1N2970	DZ						36	70	10	10W
1N2991B	S		1N2970	DZ						36	70	5.0	10W
1N2992	S		1N2970	DZ						39	65	20	10W
1N2992A	S		1N2970	DZ						39	65	10	10W
1N2992B	S		1N2970	DZ						39	65	5.0	10W
1N2993	S		1N2970	DZ						43	60	20	10W
1N2993A	S		1N2970	DZ						43	60	10	10W
1N2993B	S		1N2970	DZ						43	60	5.0	10W
1N2994	S		1N2970	DZ						45	55	20	10W
1N2994A	S		1N2970	DZ						45	55	10	10W
1N2994B	S		1N2970	DZ						45	55	5.0	10W
1N2995	S		1N2970	DZ						47	55	20	10W
1N2995A	S		1N2970	DZ						47	55	10	10W
1N2995B	S		1N2970	DZ						47	55	5.0	10W
1N2996	S		1N2970	DZ						50	50	20	10W
1N2996A	S		1N2970	DZ						50	50	10	10W
1N2996B	S		1N2970	DZ						50	50	5.0	10W
1N2997	S		1N2970	DZ						51	50	20	10W
1N2997A	S		1N2970	DZ						51	50	10	10W
1N2997B	S		1N2970	DZ						51	50	5.0	10W
1N2998	S		1N2970	DZ						52	50	20	10W
1N2998A	S		1N2970	DZ						52	50	10	10W
1N2998B	S		1N2970	DZ						52	50	5.0	10W
1N2999	S		1N2970	DZ						56	45	20	10W
1N2999A	S		1N2970	DZ						56	45	10	10W
1N2999B	S		1N2970	DZ						56	45	5.0	10W
1N3000	S		1N2970	DZ						62	40	20	10W
1N3000A	S		1N2970	DZ						62	40	10	10W
1N3000B	S		1N2970	DZ						62	40	5.0	10W
1N3001	S		1N2970	DZ						68	37	20	10W
1N3001A	S		1N2970	DZ						68	37	10	10W
1N3001B	S		1N2970	DZ						68	37	5.0	10W
1N3002	S		1N2970	DZ						75	33	20	10W
1N3002A	S		1N2970	DZ						75	33	10	10W
1N3002B	S		1N2970	DZ						75	33	5.0	10W
1N3003	S		1N2970	DZ						82	30	20	10W
1N3003A	S		1N2970	DZ						82	30	10	10W
1N3003B	S		1N2970	DZ						82	30	5.0	10W



**1N3004-1N3031**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ (volts)	@ $I_F$	$I_R$	$t_{rr}$ ( $\mu$ s)	$V_Z$ (nom)	$T_C$ %/°C	$I_{ZT}$ mA	Temp Range
1N3004	S		1N2970	DZ						91	28	20	10W
1N3004A	S		1N2970	DZ						91	28	10	10W
1N3004B	S		1N2970	DZ						91	28	5.0	10W
1N3005	S		1N2970	DZ						100	25	20	10W
1N3005A	S		1N2970	DZ						100	25	10	10W
1N3005B	S		1N2970	DZ						100	25	5.0	10W
1N3006	S		1N2970	DZ						105	25	20	10W
1N3006A	S		1N2970	DZ						105	25	10	10W
1N3006B	S		1N2970	DZ						105	25	5.0	10W
1N3007	S		1N2970	DZ						110	23	20	10W
1N3007A	S		1N2970	DZ						110	23	10	10W
1N3007B	S		1N2970	DZ						110	23	5.0	10W
1N3008	S		1N2970	DZ						120	20	20	10W
1N3008A	S		1N2970	DZ						120	20	10	10W
1N3008B	S		1N2970	DZ						120	20	5.0	10W
1N3009	S		1N2970	DZ						130	19	20	10W
1N3009A	S		1N2970	DZ						130	19	10	10W
1N3009B	S		1N2970	DZ						130	19	5.0	10W
1N3010	S		1N2970	DZ						140	18	20	10W
1N3010A	S		1N2970	DZ						140	18	10	10W
1N3010B	S		1N2970	DZ						140	18	5.0	10W
1N3011	S		1N2970	DZ						150	17	20	10W
1N3011A	S		1N2970	DZ						150	17	10	10W
1N3011B	S		1N2970	DZ						150	17	5.0	10W
1N3012	S		1N2970	DZ						160	16	20	10W
1N3012A	S		1N2970	DZ						160	16	10	10W
1N3012B	S		1N2970	DZ						160	16	5.0	10W
1N3013	S		1N2970	DZ						175	14	20	10W
1N3013A	S		1N2970	DZ						175	14	10	10W
1N3013B	S		1N2970	DZ						175	14	5.0	10W
1N3014	S		1N2970	DZ						180	14	20	10W
1N3014A	S		1N2970	DZ						180	14	10	10W
1N3014B	S		1N2970	DZ						180	14	5.0	10W
1N3015	S		1N2970	DZ						200	12	20	10W
1N3015A	S		1N2970	DZ						200	12	10	10W
1N3015B	S		1N2970	DZ						200	12	5.0	10W
1N3016	S		1N3016	DZ						6.8	37	20	1.0W
1N3016A	S		1N3016	DZ						6.8	37	10	1.0W
1N3016B	S		1N3016	DZ						6.8	37	5.0	1.0W
1N3017	S		1N3016	DZ						7.5	34	20	1.0W
1N3017A	S		1N3016	DZ						7.5	34	10	1.0W
1N3017B	S		1N3016	DZ						7.5	34	5.0	1.0W
1N3018	S		1N3016	DZ						8.2	31	20	1.0W
1N3018A	S		1N3016	DZ						8.2	31	10	1.0W
1N3018B	S		1N3016	DZ						8.2	31	5.0	1.0W
1N3019	S		1N3016	DZ						9.1	28	20	1.0W
1N3019A	S		1N3016	DZ						9.1	28	10	1.0W
1N3019B	S		1N3016	DZ						9.1	28	5.0	1.0W
1N3020	S		1N3016	DZ						10	25	20	1.0W
1N3020A	S		1N3016	DZ						10	25	10	1.0W
1N3020B	S		1N3016	DZ						10	25	5.0	1.0W
1N3021	S		1N3016	DZ						11	23	20	1.0W
1N3021A	S		1N3016	DZ						11	23	10	1.0W
1N3021B	S		1N3016	DZ						11	23	5.0	1.0W
1N3022	S		1N3016	DZ						12	21	20	1.0W
1N3022A	S		1N3016	DZ						12	21	10	1.0W
1N3022B	S		1N3016	DZ						12	21	5.0	1.0W
1N3023	S		1N3016	DZ						13	19	20	1.0W
1N3023A	S		1N3016	DZ						13	19	10	1.0W
1N3023B	S		1N3016	DZ						13	19	5.0	1.0W
1N3024	S		1N3016	DZ						15	17	20	1.0W
1N3024A	S		1N3016	DZ						15	17	10	1.0W
1N3024B	S		1N3016	DZ						15	17	5.0	1.0W
1N3025	S		1N3016	DZ						16	15.5	20	1.0W
1N3025A	S		1N3016	DZ						16	15.5	10	1.0W
1N3025B	S		1N3016	DZ						16	15.5	5.0	1.0W
1N3026	S		1N3016	DZ						18	14	20	1.0W
1N3026A	S		1N3016	DZ						18	14	10	1.0W
1N3026B	S		1N3016	DZ						18	14	5.0	1.0W
1N3027	S		1N3016	DZ						20	12.5	20	1.0W
1N3027A	S		1N3016	DZ						20	12.5	10	1.0W
1N3027B	S		1N3016	DZ						20	12.5	5.0	1.0W
1N3028	S		1N3016	DZ						22	11.5	20	1.0W
1N3028A	S		1N3016	DZ						22	11.5	10	1.0W
1N3028B	S		1N3016	DZ						22	11.5	5.0	1.0W
1N3029	S		1N3016	DZ						24	10.5	20	1.0W
1N3029A	S		1N3016	DZ						24	10.5	10	1.0W
1N3029B	S		1N3016	DZ						24	10.5	5.0	1.0W
1N3030	S		1N3016	DZ						27	9.5	20	1.0W
1N3030A	S		1N3016	DZ						27	9.5	10	1.0W
1N3030B	S		1N3016	DZ						27	9.5	5.0	1.0W
1N3031	S		1N3016	DZ						30	8.5	20	1.0W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3031A	S		1N3016	DZ						30	8.5	10	1.0W
1N3031B	S		1N3016	DZ						30	8.5	5.0	1.0W
1N3032	S		1N3016	DZ						33	7.5	20	1.0W
1N3032A	S		1N3016	DZ						33	7.5	10	1.0W
1N3032B	S		1N3016	DZ						33	7.5	5.0	1.0W
1N3033	S		1N3016	DZ						36	7.0	20	1.0W
1N3033A	S		1N3016	DZ						36	7.0	10	1.0W
1N3033B	S		1N3016	DZ						36	7.0	5.0	1.0W
1N3034	S		1N3016	DZ						39	6.5	20	1.0W
1N3034A	S		1N3016	DZ						39	6.5	10	1.0W
1N3034B	S		1N3016	DZ						39	6.5	5.0	1.0W
1N3035	S		1N3016	DZ						43	6.0	20	1.0W
1N3035A	S		1N3016	DZ						43	6.0	10	1.0W
1N3035B	S		1N3016	DZ						43	6.0	5.0	1.0W
1N3036	S		1N3016	DZ						47	5.5	20	1.0W
1N3036A	S		1N3016	DZ						47	5.5	10	1.0W
1N3036B	S		1N3016	DZ						47	5.5	5.0	1.0W
1N3037	S		1N3016	DZ						51	5.0	20	1.0W
1N3037A	S		1N3016	DZ						51	5.0	10	1.0W
1N3037B	S		1N3016	DZ						51	5.0	5.0	1.0W
1N3038	S		1N3016	DZ						56	4.5	20	1.0W
1N3038A	S		1N3016	DZ						56	4.5	10	1.0W
1N3038B	S		1N3016	DZ						56	4.5	5.0	1.0W
1N3039	S		1N3016	DZ						62	4.0	20	1.0W
1N3039A	S		1N3016	DZ						62	4.0	10	1.0W
1N3039B	S		1N3016	DZ						62	4.0	5.0	1.0W
1N3040	S		1N3016	DZ						68	3.7	20	1.0W
1N3040A	S		1N3016	DZ						68	3.7	10	1.0W
1N3040B	S		1N3016	DZ						68	3.7	5.0	1.0W
1N3041	S		1N3016	DZ						75	3.3	20	1.0W
1N3041A	S		1N3016	DZ						75	3.3	10	1.0W
1N3041B	S		1N3016	DZ						75	3.3	5.0	1.0W
1N3042	S		1N3016	DZ						82	3.0	20	1.0W
1N3042A	S		1N3016	DZ						82	3.0	10	1.0W
1N3042B	S		1N3016	DZ						82	3.0	5.0	1.0W
1N3043	S		1N3016	DZ						91	2.8	20	1.0W
1N3043A	S		1N3016	DZ						91	2.8	10	1.0W
1N3043B	S		1N3016	DZ						91	2.8	5.0	1.0W
1N3044	S		1N3016	DZ						100	2.5	20	1.0W
1N3044A	S		1N3016	DZ						100	2.5	10	1.0W
1N3044B	S		1N3016	DZ						100	2.5	5.0	1.0W
1N3045	S		1N3016	DZ						110	2.3	20	1.0W
1N3045A	S		1N3016	DZ						110	2.3	10	1.0W
1N3045B	S		1N3016	DZ						110	2.3	5.0	1.0W
1N3046	S		1N3016	DZ						120	2.0	20	1.0W
1N3046A	S		1N3016	DZ						120	2.0	10	1.0W
1N3046B	S		1N3016	DZ						120	2.0	5.0	1.0W
1N3047	S		1N3016	DZ						130	1.9	20	1.0W
1N3047A	S		1N3016	DZ						130	1.9	10	1.0W
1N3047B	S		1N3016	DZ						130	1.9	5.0	1.0W
1N3048	S		1N3016	DZ						150	1.7	20	1.0W
1N3048A	S		1N3016	DZ						150	1.7	10	1.0W
1N3048B	S		1N3016	DZ						150	1.7	5.0	1.0W
1N3049	S		1N3016	DZ						160	1.6	20	1.0W
1N3049A	S		1N3016	DZ						160	1.6	10	1.0W
1N3049B	S		1N3016	DZ						160	1.6	5.0	1.0W
1N3050	S		1N3016	DZ						180	1.4	20	1.0W
1N3050A	S		1N3016	DZ						180	1.4	10	1.0W
1N3050B	S		1N3016	DZ						180	1.4	5.0	1.0W
1N3051	S		1N3016	DZ						200	1.2	20	1.0W
1N3051A	S		1N3016	DZ							1.2	10	1.0W
1N3051B	S		1N3016	DZ							1.2	5.0	1.0W
1N3052	S			R	12K	70	0.1	0.2	6.0				
1N3053	S			R	14K	75	0.1	0.2	6.0				
1N3054	S			R	16K	80	0.1	0.2	6.0				
1N3055	S			R	18K	85	0.1	0.2	6.0				
1N3056	S			R	20K	90	0.1	0.2	6.0				
1N3057	S			R	22K	95	0.1	0.2	6.0				
1N3058	S			R	24K	100	0.1	0.2	6.0				
1N3059	S			R	26K	105	0.1	0.2	6.0				
1N3060	S			R	28K	120	0.1	0.2	6.0				
1N3061	S			R	30K	125	0.1	0.2	6.0				
1N3062	S			DS	75	1.0	20M	0.1*	2.0				
1N3063	S			DS	75	0.85	10M	0.1*	2.0				
1N3064	S			DS	75	1.0	10M	0.1*	4.0				
1N3065	S			DS	75	1.0	20M	0.1*	2.0				
1N3066	S			DS	75	1.0	10M	0.1*	2.0				
1N3067	S			DS	30	1.0	5.0M	0.1*	2.0				
1N3068	S			DS	30	1.0	5.0M	0.1*	50				
1N3069	S			DS	65	1.0	50M	0.1*	50				
1N3070	S			DS	200	1.0	100M	0.1*	50				
1N3071	S			DS	200	1.0	100M	0.1*	50				



**1N3072-1N3168**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N3072	S	1N4001	1N4001	R	50	1.5	0.2	0.5	10				
1N3073	S	1N4002	1N4001	R	100	1.5	0.2	0.5	10				
1N3074	S	1N4003	1N4001	R	150	1.5	0.2	0.5	10				
1N3075	S	1N4003	1N4001	R	200	1.5	0.2	0.5	10				
1N3076	S	1N4004	1N4001	R	250	1.5	0.2	0.5	10				
1N3077	S	1N4004	1N4001	R	300	1.5	0.2	0.5	10				
1N3078	S	1N4004	1N4001	R	350	1.5	0.2	0.5	10				
1N3079	S	1N4004	1N4001	R	400	1.5	0.2	0.5	10				
1N3080	S	1N4005	1N4001	R	500	1.5	0.2	0.5	10				
1N3081	S	1N4005	1N4001	R	600	1.5	0.2	0.5	10				
1N3082	S	1N4003	1N4001	R	200	1.25	0.5	0.2	15				
1N3083	S	1N4004	1N4001	R	400	1.25	0.5	0.2	15				
1N3084	S	1N4005	1N4001	R	600	1.25	0.5	0.2	15				
1N3085	S	MR1221SB	MR1220	R	100	1.1	150	40	1500				
1N3086	S	MR1223SB	MR1220	R	200	1.1	150	40	1500				
1N3087	S	MR1225SB	MR1200	R	300	1.1	150	40	1500				
1N3088	S	MR1227SB	MR1200	R	400	1.1	150	40	1500				
1N3089	S	MR1228SB	MR1200	R	500	1.1	150	40	1500				
1N3090	S	MR1229SB	MR1220	R	600	1.1	150	40	1500				
1N3091	S			R	800	1.1	150	40	1500				
1N3092	S			R	1000	1.1	150	40	1500				
1N3093	G	X-band Switch											
1N3097	G		1N3016	DS	30	0.5	10M	4.0*	0.5				
1N3098,A	S	1N3046A		DZ						120	3.0	20/10	1.0W
1N3099,A	S	1N3048A		DZ						150	3.0	20/10	1.0W
1N3100,A	S	1N3050A		DZ						180	3.0	20/10	1.0W
1N3101,A	S	1N3051A		DZ						220	3.0	20/10	1.0W
1N3102,A	S	1N3008A	1N2970	DZ						120	3.0	20/10	10W
1N3103,A	S	1N3011A	1N2970	DZ						150	3.0		10W
1N3104,A	S	1N3014A	1N2970	DZ						180	3.0		10W
1N3105,A	S	1N3015A	1N2970	DZ						220	3.0		10W
1N3106	S			R	800	1.6	0.75	0.3	30				
1N3107	S			R	1200	3.2	0.5	0.3	15				
1N3108	S			R	800	1.6	1.5	0.3	30				
1N3109	S			R	1200	3.2	0.7	0.3	15				
1N3110	G			DS	8.0	0.45	5.0M	20*					
1N3111	S	MR1220SB	MR1220	R	50	1.1	150	40	1500				
1N3112	S	1N4737A	1N4728	DZ						7.4	120	5.0	1.0W
1N3113													
thru	GA	Tunnel Diodes											
1N3120													
1N3121	G			DS	50	0.25	0.1M	3.5*	0.5				
1N3122	G			DS	20	0.3	1.0M	4.5*					
1N3123	S			DS	40	1.5	10M	0.1*	4.0				
1N3124	S			DS	40	1.0	20M	0.1*	4.0				
1N3125	G			DS	40	0.4	5.0M	100*	0.3				
1N3128													
thru	G	Tunnel Diodes											
1N3130													
1N3138	GA	Tunnel Diode											
1N3139	S			R	50	1.55	70	15	1200				
1N3140	S			R	100	1.55	70	15	1200				
1N3141	S			R	150	1.55	70	15	1200				
1N3142	S			R	200	1.55	70	15	1200				
1N3143	G	Microwave C-X-band Detector											
1N3144	G			DS	20	0.3	1.0M	20*	0.5				
1N3145	G			DS	65	0.45	10M	25*					
1N3146	G			DS	20	1.0	50M	100*	2.0				
1N3147	S			DS	45	1.0	100M		1.0				
1N3148	S	1N3155A	1N3154	DR						8.5	0.005	10	-55/100
1N3149	G	Tunnel Diode											
1N3149A	G	Tunnel Diode											
1N3150	G	Tunnel Diode											
1N3151	S			R	7200	27	0.1	250	12				
1N3154	S		1N3154	DR						8.8	0.01	10	-55/100
1N3154A	S		1N3154	DR						8.8	0.01	10	-55/100
1N3155	S		1N3154	DR						8.8	0.005	10	-55/100
1N3155A	S		1N3154	DR						8.8	0.005	10	-55/100
1N3156	S		1N3154	DR						8.8	0.002	10	-55/100
1N3156A	S		1N3154	DR						8.8	0.002	10	-55/100
1N3157	S		1N3154	DR						8.8	0.001	10	-55/100
1N3157A	S		1N3154	DR						8.8	0.001	10	-55/100
1N3159	G			DS	15	0.45	10M		0.3				
1N3160	G			DS	60	1.0	5.0M	12*					
1N3161	S	MR1230SB	MR1230	R	50	1.30	240	16	3000				
1N3162	S	MR1231SB	MR1230	R	100	1.30	240	16	3000				
1N3163	S	MR1232SB	MR1230	R	150	1.30	240	16	3000				
1N3164	S	MR1233SB	MR1230	R	200	1.30	240	16	3000				
1N3165	S	MR1234SB	MR1230	R	250	1.30	240	16	3000				
1N3166	S	MR1235SB	MR1230	R	300	1.30	240	16	3000				
1N3167	S	MR1236SB	MR1230	R	350	1.30	240	16	3000				
1N3168	S	MR1237SB	MR1230	R	400	1.30	240	16	3000				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3169	S	MR1238SB	MR1230	R	500	1.30	240	16	3000				
1N3170	S	MR1239SB	MR1230	R	600	1.30	240	16	3000				
1N3171	S			R	700	1.92	240	16	3000				
1N3171A	S			R	700	1.9	240	16	3000				
1N3172	S			R	800	1.92	240	16	3000				
1N3172A	S			R	800	1.9	240	16	3000				
1N3173	S			R	900	1.92	240	16	3000				
1N3173A	S			R	900	1.9	240	16	3000				
1N3174	S			R	1000	1.92	240	16	3000				
1N3174A	S			R	1000	1.9	240	16	3000				
1N3175	S			R	1200	1.4	240	15	3000				
1N3176	S			R	1400	1.4	240	15	3000				
1N3177	S			R	1600	1.4	240	15	3000				
1N3179	S			DS	200	1.0	100M	10*					
1N3180	S			DS	110	1.5	500M	5.0*					
1N3181	S	1N5237A	1N5221	DZ	Varactor Diode, see Table on Page 1-100					7.7	14	10	0.6
1N3182	S			R	350	1.0	0.5		4.0				
1N3183	S			R	500	1.0	0.5		4.0				
1N3185	S			R	700	2.0	0.5		4.0				
1N3186	S			R	1000	2.0	0.5		4.0				
1N3187	S			R	1500	3.0	0.5		4.0				
1N3188	S			R	2000	4.0	0.5		4.0				
1N3189	S	1N4003	1N4001	R	200	1.1	1.0	0.2	30				
1N3190	S	1N4004	1N4001	R	400	1.1	1.0	0.2	30				
1N3191	S	1N4005	1N4001	R	600	1.1	1.0	0.2	30				
1N3192	S			DS	200	1.0	100M	10*					
1N3193	S	1N4003	1N4001	R	200	1.2	0.75	0.2	40				
1N3194	S	1N4004	1N4001	R	400	1.2	0.75	0.2	40				
1N3195	S	1N4005	1N4001	R	600	1.2	0.75	0.2	40				
1N3196	S	1N4006	1N4001	R	800	1.2	0.75	0.2	40				
1N3197	G			DS	30	1.0	150M	50*	0.3				
1N3198	S	1N5221B	1N5221	DZ						2.25	10	2.0	0.4
1N3199	S	1N3155	1N3154	DR						8.8	0.005	10	50/100
1N3200	S	1N3156	1N3154	DR						8.8	0.003	10	50/100
1N3201	S	1N3156	1N3154	DR						8.8	0.002	10	50/100
1N3202	S	1N3157	1N3154	DR						8.8	0.001	10	50/100
1N3203	G			DS	25	0.5	35M	50*	0.3				
1N3206	S			DS	80	1.0	10M	5.0*	4.0				
1N3207	S			DS	50	1.0	150M	0.05*	6.0				
1N3208	S		1N3208	R	50	1.5	15	10	250				
1N3209	S		1N3208	R	100	1.5	15	10	250				
1N3210	S		1N3208	R	200	1.5	15	10	250				
1N3211	S		1N3208	R	300	1.5	15	10	250				
1N3212	S		1N3208	R	400	1.5	15	10	250				
1N3213	S		1N248B	R	500	1.5	15	10	250				
1N3214	S		1N248B	R	600	1.5	15	10	250				
1N3215	S			DS	80	0.7	1.0M	10*	0.25				
1N3217 thru 1N3222	G	Tunnel Diodes											
1N3223	S			DS	150	1.5	4.0M	20*	800				
1N3225	G			DS	40	1.0	5.0M	33*	0.5				
1N3227	S			R	100	3.3	0.5	0.250	12.5				
1N3228	S			R	200	3.3	0.5	0.250	12.5				
1N3229	S			R	400	3.3	0.5	0.250	12.5				
1N3230	S			R	600	3.3	0.5	0.250	12.5				
1N3231	S			R	800	3.3	0.5	0.250	12.5				
1N3232	S			R	1000	3.3	0.5	0.250	12.5				
1N3233	S			R	1200	3.3	0.5	0.250	12.5				
1N3234	S			R	1500	3.3	0.5	0.250	12.5				
1N3235	S			R	1800	3.3	0.5	0.250	12.5				
1N3236	S			R	2000	3.3	0.5	0.250	12.5				
1N3237	S			R	50	2.2	0.75	0.250	15.0				
1N3238	S			R	100	2.2	0.75	0.250	15.0				
1N3239	S			R	200	2.2	0.75	0.250	15.0				
1N3240	S			R	400	2.2	0.75	0.250	15.0				
1N3241	S			R	600	2.2	0.75	0.250	15.0				
1N3242	S			R	800	2.2	0.75	0.250	15.0				
1N3243	S			R	1000	2.2	0.75	0.250	15.0				
1N3244	S			R	1200	2.2	0.75	0.250	15.0				
1N3245	S			R	1500	2.2	0.75	0.250	15.0				
1N3246	S			R	50	1.1	1.0	0.250	20.0				
1N3247	S			R	100	1.1	1.0	0.250	20.0				
1N3248	S			R	200	1.1	1.0	0.250	20.0				
1N3249	S			R	400	1.1	1.0	0.250	20.0				
1N3250	S			R	600	1.1	1.0	0.250	20.0				
1N3251	S			R	800	1.1	1.0	0.250	20.0				
1N3252	S			R	1000	1.1	1.0	0.250	20.0				
1N3253	S	1N4003	1N4001	R	200	1.2	0.75	0.2	40				
1N3254	S	1N4004	1N4001	R	400	1.2	0.75	0.2	40				
1N3255	S	1N4005	1N4001	R	600	1.2	0.75	0.2	40				



**1N3256-1N3313B**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N3256	S	1N4006	1N4001	R	800	1.2	0.5	0.2	40				
1N3257	S			DS	80	1.0	30M	0.025*	300				
1N3258	S			DS	80	1.0	100M	0.025*	400				
1N3260	S	MR1220SB	MR1220	R	50	1.6	160	12	2000				
1N3261	S	MR1221SB	MR1220	R	100	1.6	160	12	2000				
1N3262	S	MR1222SB	MR1220	R	150	1.6	160	12	2000				
1N3263	S	MR1223SB	MR1220	R	200	1.6	160	12	2000				
1N3264	S	MR1224SB	MR1220	R	250	1.6	160	12	2000				
1N3265	S	MR1225SB	MR1220	R	300	1.6	160	12	2000				
1N3266	S	MR1226SB	MR1220	R	350	1.6	160	12	2000				
1N3267	S	MR1227SB	MR1220	R	400	1.6	160	12	2000				
1N3268	S	MR1228SB	MR1220	R	500	1.6	160	12	2000				
1N3269	S	MR1229SB	MR1220	R	600	1.6	160	12	2000				
1N3270	S			R	700	1.6	160	12	2000				
1N3271	S			R	800	1.6	160	12	2000				
1N3272	S			R	900	1.6	160	12	2000				
1N3273	S			R	1000	1.6	160	12	2000				
1N3274	S			R	1200	1.4	160	12	2000				
1N3275	S			R	1400	1.4	160	12	2000				
1N3276	S			R	1600	1.4	160	12	2000				
1N3277	S			R	200	1.3	0.75		25				
1N3278	S			R	400	1.3	0.75		25				
1N3279	S			R	600	1.3	0.75		25				
1N3280	S			R	800	1.3	0.75		25				
1N3281	S			R	1000	1.3	0.75		25				
1N3282	S		1N3213	R	1000	3.7	0.1		2.5				
1N3283	S		1N3213	R	1500	3.7	0.1		2.5				
1N3284	S		1N3213	R	2000	3.7	0.1		2.5				
1N3285	S		1N3213	R	2500	3.7	0.1		2.5				
1N3286	S		1N3213	R	3000	3.7	0.1		2.5				
1N3287	G			DS	6.0	0.312	1.0M	15*					
1N3288	S			R	100	1.5	100	200	1600				
1N3288A	S	MR1811R		R	100	1.5	100	24	2300				
1N3289	S			R	200	1.5	100	300	1600				
1N3289A	S	MR1813R		R	200	1.5	100	24	2300				
1N3290	S			R	300	1.5	100	400	1600				
1N3290A	S	MR1815R		R	300	1.5	100	24	2300				
1N3291	S			R	400	1.5	100	525	1600				
1N3291A	S	MR1817R		R	400	1.5	100	24	2300				
1N3292	S			R	500	1.5	100	650	1600				
1N3292A	S			R	500	1.5	100	21	1600				
1N3292B	S	MR1818SB		R	500	1.5	100	21	2300				
1N3293	S			R	600	1.5	100	800	1600				
1N3293A	S	MR1819SB		R	600	1.5	100	17	2300				
1N3294	S			R	800	1.5	100	1050	1600				
1N3294A	S			R	800	1.5	100	13	2300				
1N3295	S			R	1000	1.5	100	1300	1600				
1N3295A	S			R	1000	1.5	100	11	2300				
1N3296	S			R	1200	1.5	100	1600	1600				
1N3296A	S			R	1200	1.5	100	9.0	2300				
1N3297	S			R	1400	1.5	100	1800	1600				
1N3297A	S			R	1400	1.5	100	7.0	2300				
1N3298	S			DS	70	0.9	500M	0.2*	20				
1N3298A	S			DS	70	0.9	0.5A	0.2*					
1N3299 thru 1N3304, A		4-Layer Diodes, see Table on Page 1-96											
1N3305	S		1N2804	DZ						6.8	1850	20	50W
1N3305A	S		1N2804	DZ						6.8	1850	10	50W
1N3305B	S		1N2804	DZ						6.8	1850	5.0	50W
1N3306	S		1N2804	DZ						7.5	1700	20	50W
1N3306A	S		1N2804	DZ						7.5	1700	10	50W
1N3306B	S		1N2804	DZ						7.5	1700	5.0	50W
1N3307	S		1N2804	DZ						8.2	1500	20	50W
1N3307A	S		1N2804	DZ						8.2	1500	10	50W
1N3307B	S		1N2804	DZ						8.2	1500	5.0	50W
1N3308	S		1N2804	DZ						9.1	1370	20	50W
1N3308A	S		1N2804	DZ						9.1	1370	10	50W
1N3308B	S		1N2804	DZ						9.1	1370	5.0	50W
1N3309	S		1N2804	DZ						10	1200	20	50W
1N3309A	S		1N2804	DZ						10	1200	10	50W
1N3309B	S		1N2804	DZ						10	1200	5.0	50W
1N3310	S		1N2804	DZ						11	1100	20	50W
1N3310A	S		1N2804	DZ						11	1100	10	50W
1N3310B	S		1N2804	DZ						11	1100	5.0	50W
1N3311	S		1N2804	DZ						12	1000	20	50W
1N3311A	S		1N2804	DZ						12	1000	10	50W
1N3311B	S		1N2804	DZ						12	1000	5.0	50W
1N3312	S		1N2804	DZ						13	960	20	50W
1N3312A	S		1N2804	DZ						13	960	10	50W
1N3312B	S		1N2804	DZ						13	960	5.0	50W
1N3313	S		1N2804	DZ						14	890	20	50W
1N3313A	S		1N2804	DZ						14	890	10	50W
1N3313B	S		1N2804	DZ						14	890	5.0	50W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>r</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3314	S		1N2804	DZ						15	830	20	50W
1N3314A	S		1N2804	DZ						15	830	10	50W
1N3314B	S		1N2804	DZ						15	830	5.0	50W
1N3315	S		1N2804	DZ						16	780	20	50W
1N3315A	S		1N2804	DZ						16	780	10	50W
1N3315B	S		1N2804	DZ						16	780	5.0	50W
1N3316	S		1N2804	DZ						17	740	20	50W
1N3316A	S		1N2804	DZ						17	740	10	50W
1N3316B	S		1N2804	DZ						17	740	5.0	50W
1N3317	S		1N2804	DZ						18	700	20	50W
1N3317A	S		1N2804	DZ						18	700	10	50W
1N3317B	S		1N2804	DZ						18	700	5.0	50W
1N3318	S		1N2804	DZ						19	660	20	50W
1N3318A	S		1N2804	DZ						19	660	10	50W
1N3318B	S		1N2804	DZ						19	660	5.0	50W
1N3319	S		1N2804	DZ						20	630	20	50W
1N3319A	S		1N2804	DZ						20	630	10	50W
1N3319B	S		1N2804	DZ						20	630	5.0	50W
1N3320	S		1N2804	DZ						22	570	20	50W
1N3320A	S		1N2804	DZ						22	570	10	50W
1N3320B	S		1N2804	DZ						22	570	5.0	50W
1N3321	S		1N2804	DZ						24	520	20	50W
1N3321A	S		1N2804	DZ						24	520	10	50W
1N3321B	S		1N2804	DZ						24	520	5.0	50W
1N3322	S		1N2804	DZ						25	500	20	50W
1N3322A	S		1N2804	DZ						25	500	10	50W
1N3322B	S		1N2804	DZ						25	500	5.0	50W
1N3323	S		1N2804	DZ						27	460	20	50W
1N3323A	S		1N2804	DZ						27	460	10	50W
1N3323B	S		1N2804	DZ						27	460	5.0	50W
1N3324	S		1N2804	DZ						30	420	20	50W
1N3324A	S		1N2804	DZ						30	420	10	50W
1N3324B	S		1N2804	DZ						30	420	5.0	50W
1N3325	S		1N2804	DZ						33	380	20	50W
1N3325A	S		1N2804	DZ						33	380	10	50W
1N3325B	S		1N2804	DZ						33	380	5.0	50W
1N3326	S		1N2804	DZ						36	350	20	50W
1N3326A	S		1N2804	DZ						36	350	10	50W
1N3326B	S		1N2804	DZ						36	350	5.0	50W
1N3327	S		1N2804	DZ						39	320	20	50W
1N3327A	S		1N2804	DZ						39	320	10	50W
1N3327B	S		1N2804	DZ						39	320	5.0	50W
1N3328	S		1N2804	DZ						43	290	20	50W
1N3328A	S		1N2804	DZ						43	290	10	50W
1N3328B	S		1N2804	DZ						43	290	5.0	50W
1N3329	S		1N2804	DZ						45	280	20	50W
1N3329A	S		1N2804	DZ						45	280	10	50W
1N3329B	S		1N2804	DZ						45	280	5.0	50W
1N3330	S		1N2804	DZ						47	270	20	50W
1N3330A	S		1N2804	DZ						47	270	10	50W
1N3330B	S		1N2804	DZ						47	270	5.0	50W
1N3331	S		1N2804	DZ						50	250	20	50W
1N3331A	S		1N2804	DZ						50	250	10	50W
1N3331B	S		1N2804	DZ						50	250	5.0	50W
1N3332	S		1N2804	DZ						51	245	20	50W
1N3332A	S		1N2804	DZ						51	245	10	50W
1N3332B	S		1N2804	DZ						51	245	5.0	50W
1N3333	S		1N2804	DZ						52	240	20	50W
1N3333A	S		1N2804	DZ						52	240	10	50W
1N3333B	S		1N2804	DZ						52	240	5.0	50W
1N3334	S		1N2804	DZ						56	220	20	50W
1N3334A	S		1N2804	DZ						56	220	10	50W
1N3334B	S		1N2804	DZ						56	220	5.0	50W
1N3335	S		1N2804	DZ						62	200	20	50W
1N3335A	S		1N2804	DZ						62	200	10	50W
1N3335B	S		1N2804	DZ						62	200	5.0	50W
1N3336	S		1N2804	DZ						68	180	20	50W
1N3336A	S		1N2804	DZ						68	180	10	50W
1N3336B	S		1N2804	DZ						68	180	5.0	50W
1N3337	S		1N2804	DZ						75	170	20	50W
1N3337A	S		1N2804	DZ						75	170	10	50W
1N3337B	S		1N2804	DZ						75	170	5.0	50W
1N3338	S		1N2804	DZ						82	150	20	50W
1N3338A	S		1N2804	DZ						82	150	10	50W
1N3338B	S		1N2804	DZ						82	150	5.0	50W
1N3339	S		1N2804	DZ						91	140	20	50W
1N3339A	S		1N2804	DZ						91	140	10	50W
1N3339B	S		1N2804	DZ						91	140	5.0	50W
1N3340	S		1N2804	DZ						100	120	20	50W
1N3340A	S		1N2804	DZ						100	120	10	50W
1N3340B	S		1N2804	DZ						100	120	5.0	50W
1N3341	S		1N2804	DZ						105	120	20	50W



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TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3341A	S		1N2804	DZ						105	120	10	50W
1N3341B	S		1N2804	DZ						105	120	5.0	50W
1N3342	S		1N2804	DZ						110	110	20	50W
1N3342A	S		1N2804	DZ						110	110	10	50W
1N3342B	S		1N2804	DZ						110	110	5.0	50W
1N3343	S		1N2804	DZ						120	100	20	50W
1N3343A	S		1N2804	DZ						120	100	10	50W
1N3343B	S		1N2804	DZ						120	100	5.0	50W
1N3344	S		1N2804	DZ						130	95	20	50W
1N3344A	S		1N2804	DZ						130	95	10	50W
1N3344B	S		1N2804	DZ						130	95	5.0	50W
1N3345	S		1N2804	DZ						140	90	20	50W
1N3345A	S		1N2804	DZ						140	90	10	50W
1N3345B	S		1N2804	DZ						140	90	5.0	50W
1N3346	S		1N2804	DZ						150	85	20	50W
1N3346A	S		1N2804	DZ						150	85	10	50W
1N3346B	S		1N2804	DZ						150	85	5.0	50W
1N3347	S		1N2804	DZ						160	80	20	50W
1N3347A	S		1N2804	DZ						160	80	10	50W
1N3347B	S		1N2804	DZ						160	80	5.0	50W
1N3348	S		1N2804	DZ						175	70	20	50W
1N3348A	S		1N2804	DZ						175	70	10	50W
1N3348B	S		1N2804	DZ						175	70	5.0	50W
1N3349	S		1N2804	DZ						180	68	20	50W
1N3349A	S		1N2804	DZ						180	68	10	50W
1N3349B	S		1N2804	DZ						180	68	5.0	50W
1N3350	S		1N2804	DZ						200	65	20	50W
1N3350A	S		1N2804	DZ						200	65	10	50W
1N3350B	S		1N2804	DZ						200	65	5.0	50W
1N3353	G	Backward Diode											
1N3354	S			R	10	1.2	3.0	0.020	30				
1N3355	S			R	15	1.2	3.0	0.020	30				
1N3356	S			R	25	1.2	3.0	0.010	30				
1N3357	S			R	50	1.2	3.0	0.010	30				
1N3358	S			R	75	1.2	3.0	0.010	30				
1N3359	S			R	100	1.2	3.0	0.010	30				
1N3360	S			R	150	1.2	3.0	0.010	30				
1N3361	S			R	200	1.2	3.0	0.010	30				
1N3362	S			R	300	1.2	3.0	0.010	30				
1N3363	S			R	400	1.2	3.0	0.010	30				
1N3364	S			R	500	1.2	3.0	0.010	30				
1N3365	S			R	600	1.2	3.0	0.010	30				
1N3366	S			R	700	1.2	3.0	0.010	30				
1N3367	S			R	800	2.0	3.0	0.010	30				
1N3368	S			R	900	2.0	3.0	0.010	30				
1N3369	S			R	1000	2.5	3.0	0.025	30				
1N3370	S			R	1200	2.5	3.0	0.025	30				
1N3371	S			R	1500	2.5	3.0	0.025	30				
1N3372	S			R	10	1.0	20	0.315	200				
1N3373	S			R	25	1.0	20	0.315	200				
1N3374	S			R	50	1.0	20	0.315	200				
1N3375	S			R	100	1.0	20	0.315	200				
1N3376	S			R	150	1.0	20	0.315	200				
1N3377	S			R	200	1.0	20	0.315	200				
1N3378	S			R	300	1.0	20	0.315	200				
1N3379	S			R	400	1.0	20	0.315	200				
1N3380	S			R	500	1.0	20	0.315	200				
1N3381	S			DS	15	1.0	500M	10*					
1N3382	S			DS	15	1.0	500M	10*					
1N3383	S			DS	50	1.0	500M	10*					
1N3384	S			DS	75	1.0	500M	15*					
1N3385	S			DS	100	1.0	500M	20*					
1N3386	S			DS	150	1.0	500M	20*					
1N3387	S			DS	200	1.0	500M	20*					
1N3388	S			DS	250	1.0	500M	25*					
1N3389	S			DS	300	1.0	500M	25*					
1N3390	S			DS	400	1.0	500M	25*					
1N3391	S			DS	500	1.0	500M	25*					
1N3392	S			DZ						1.5	50	10	500M
1N3393	S	.5M1.8ZZS10	†	DZ						1.8	50	10	500M
1N3394	S	.5M2.2ZZS10	†	DZ						2.2	50	10	500M
1N3395	S	.5M2.7ZZS10	†	DZ						2.7	50	10	500M
1N3396	S	.5M3.3ZZS10	†	DZ						3.3	30	10	500M
1N3397	S	.5M3.9ZZS10	†	DZ						3.9	30	10	500M
1N3398	S	.5M4.7ZZS10	†	DZ						4.7	30	10	500M
1N3399	S	.5M5.6ZZS10	†	DZ						5.6	20	10	500M
1N3400	S	.5M6.8ZZS10	†	DZ						6.8	20	10	500M
1N3401	S	.5M8.2ZZS10	†	DZ						8.2	10	10	500M
1N3402	S	.5M10ZZS10	†	DZ						10	10	10	500M
1N3403	S	.5M12ZZS10	†	DZ						12	10	10	500M
1N3404	S	.5M15AAS10	†	DZ						15	10	10	500M
1N3405	S	.5M18ZZS10	†	DZ						18	10	10	500M

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ @ (volts)	$I_F$	$I_R$	$t_{rr}$ ( $\mu$ s)	$V_Z$ (nom)	$T_C$ °C	$I_{ZT}$ mA	Temp Range
1N3406	S	.5M22ZS10	†	DZ						22	3.0	10	500M
1N3407	S	.5M27ZS10	†	DZ						27	3.0	10	500M
1N3408	S	.5M33ZS10	†	DZ						33	3.0	10	500M
1N3409	S	.5M39ZS10	†	DZ						39	1.5	10	500M
1N3410	S	.5M47ZS10	†	DZ						47	1.5	10	500M
1N3411	S	1N5234A	1N5221	DZ						6.2	1.0	10	500M
1N3412	S	1N5235A	1N5221	DZ						6.8	1.0	10	500M
1N3413	S	1N5236A	1N5221	DZ						7.5	1.0	10	500M
1N3414	S	1N5237A	1N5221	DZ						8.2	1.0	10	500M
1N3415	S	1N5240A	1N5221	DZ						10	1.0	10	500M
1N3416	S	1N5242A	1N5221	DZ						12	1.0	10	500M
1N3417	S	1N5245A	1N5221	DZ						15	1.0	10	500M
1N3418	S	1N5248A	1N5221	DZ						18	1.0	10	500M
1N3419	S	1N5251A	1N5221	DZ						22	1.0	10	500M
1N3420	S	1N5254A	1N5221	DZ						27	1.0	10	500M
1N3421	S	1N5256A	1N5221	DZ						30	1.0	10	500M
1N3422	S	1N5257A	1N5221	DZ						33	1.0	10	500M
1N3423	S	1N5259A	1N5221	DZ						39	1.0	10	500M
1N3424	S	1N5261A	1N5221	DZ						47	1.0	10	500M
1N3425	S	1N5263A	1N5221	DZ						56	1.0	10	500M
1N3426	S	1N5266A	1N5222	DZ						68	1.0	10	500M
1N3427	S	1N5268A	1N5221	DZ						82	1.0	10	500M
1N3428	S	1N5271A	1N5221	DZ						100	1.0	10	500M
1N3429	S	1N5273A	1N5221	DZ						120	1.0	10	500M
1N3430	S	1N5276A	1N5221	DZ						150	1.0	10	500M
1N3431	S	1N5279A	1N5221	DZ						180	1.0	10	500M
1N3432	S	1N5281A	1N5221	DZ						220	1.0	10	500M
1N3433	S	1N4738	1N4728	DZ						8.2	25	10	2.0W
1N3434	S	1N4740	1N4728	DZ						10.0	25	10	2.0W
1N3435	S	1N4742	1N4728	DZ						12.0	25	10	2.0W
1N3436	S	1N4744	1N4728	DZ						15.0	25	10	2.0W
1N3437	S	1N4746	1N4728	DZ						18.0	25	10	2.0W
1N3438	S	1N4748	1N4728	DZ						22.0	7.5	10	2.0W
1N3439	S	1N4750	1N4728	DZ						27.0	7.5	10	2.0W
1N3440	S	1N4752	1N4728	DZ						33.0	7.5	10	2.0W
1N3441	S	1N4754	1N4728	DZ						39.0	7.5	10	2.0W
1N3442	S	1N4756	1N4728	DZ						47.0	7.5	10	2.0W
1N3443	S	1N4735	1N4728	DZ						6.2	2.0	10	2.0W
1N3444	S	1N4736	1N4728	DZ						6.8	2.0	10	2.0W
1N3445	S	1N4738	1N4728	DZ						8.2	2.0	10	2.0W
1N3446	S	1N4740	1N4728	DZ						10	2.0	10	2.0W
1N3447	S	1N4742	1N4728	DZ						12	2.0	10	2.0W
1N3448	S	1N4744	1N4728	DZ						15	2.0	10	2.0W
1N3449	S	1N4746	1N4728	DZ						18	2.0	10	2.0W
1N3450	S	1N4748	1N4728	DZ						22	2.0	10	2.0W
1N3451	S	1N4750	1N4728	DZ						27	2.0	10	2.0W
1N3452	S	1N4751	1N4728	DZ						30	2.0	10	2.0W
1N3453	S	1N4752	1N4728	DZ						33	2.0	10	2.0W
1N3454	S	1N4754	1N4728	DZ						39	2.0	10	2.0W
1N3455	S	1N4756	1N4728	DZ						47	2.0	10	2.0W
1N3456	S	1N4758	1N4728	DZ						56	2.0	10	2.0W
1N3457	S	1N4760	1N4728	DZ						68	2.0	10	2.0W
1N3458	S	1N4762	1N4728	DZ						82	2.0	10	2.0W
1N3459	S	1N4764	1N4728	DZ						100	2.0	10	2.0W
1N3460	S	1M120ZS10	1N4728	DZ						120	2.0	10	2.0W
1N3461	S	1M150ZS10	1N4728	DZ						150	2.0	10	2.0W
1N3462	S	1M180ZS10	1N4728	DZ						180	2.0	10	2.0W
1N3463	S	1M200ZS5	1N4728	DZ						220	2.0	10	2.0W
1N3464	R			DS	8500	30.0	0.1	0.001	2.0				
1N3465	G			DS	60	1.0	200M	20*					
1N3466	G			DS	40	1.0	200M	15*					
1N3467	G			DS	15	0.5	20M	15*	2.0				
1N3468	G			DS	15	0.5	20M	60*	2.0				
1N3469	G			DS	35	0.5	600M	15*					
1N3470	G			DS	35	0.5	600M	30*					
1N3471	S			DS	40	1.0	10M	20N	2.0				
1N3473	S			R	200	1.4	0.75	0.5	20				
1N3474	S			R	400	1.4	0.75	0.5	20				
1N3475	S			R	600	1.4	0.75	0.5	20				
1N3476	S			R	800	1.4	0.5	0.5	20				
1N3477	S	1N5221A	1N5221	DZ						2.2	5.0	10	250M
1N3477A	S	1N5221B	1N5221	DZ						2.2	5.0	5.0	250M
1N3478	S			DS	200	1.0	500M	10*					
1N3479	S			DS	400	1.0	500M	10*					
1N3480	S			DS	600	1.0	500M	10*					
1N3481	G	RF Power Switch:	$P_i$ (max)		= 10 mW,	f = 9,000 MHz							
1N3482	G	RF Power Switch:	$P_i$ (max)		= 10 mW,	f = 9,000 MHz							
1N3483	G			DS	8.0	0.6	10M	30*					
1N3484	G			DS	75	0.45	10M	4.0*					
1N3485	S			DS	175	1.0	10M	25N	0.05				
1N3486	S			R	1000	2.0	0.4	0.05	10				
1N3487	S			R	1200	2.0	0.4	0.05	10				

†See page 1-1a for ordering information.



**1N3488-1N3566**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3488 1N3489 1N3490 1N3491 1N3492 1N3493 1N3494 1N3495 1N3496 1N3497 1N3498		Varactor Diode, see Table on Page 1-100 4-Layer Diodes, see Table on Page 1-96											
	S			R	50	1.7	18	1.0	300				
	S			R	100	1.7	18	1.0	300				
	S			R	200	1.7	18	1.0	300				
	S			R	300	1.7	18	1.0	300				
	S			R	400	1.7	18	1.0	300				
	S	1N823 *	1N821	DR						6.2	0.005	7.5	-55/100
	S	1N825 *	1N821	DR						6.2	0.002	7.5	-55/100
	S	1N827 *	1N821	DR						6.2	0.001	7.5	-55/100
1N3499 1N3500 1N3501 1N3502 1N3503 1N3504 1N3506 1N3507 1N3508 1N3509 1N3510 1N3511	S	1N829 * 1N821 * M2640 * M2620 * M2610 * M2605 * 1N5226B * 1N5227B * 1N5228B * 1N5229B * 1N5230B * 1N5231B *	1N821 1N821 M2600 M2600 M2600 M2600 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221	DR DR DR DR DR DR DZ DZ DZ DZ DZ DZ						6.2 6.2 6.35 6.35 6.35 6.35 3.3 3.6 3.9 4.3 4.7 5.1	0.0005 0.01 0.01 0.01 0.005 0.002 20 20 20 20 20 20	7.5 7.5 7.5 7.5 7.5 7.5 5.0 5.0 5.0 5.0 5.0 5.0	-55/100 -55/100 -55/100 -55/100 -55/100 -55/100 20 20 20 20 20 20
1N3512 1N3513 1N3514 1N3515 1N3516 1N3517 1N3518 1N3519 1N3520 1N3521 1N3522 1N3523	S	1N5232B * 1N5234B * 1N5235B * 1N5236B * 1N5237B * 1N5239B * 1N5240B * 1N5241B * 1N5242B * 1N5243B * 1N5245B * 1N5246B *	1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221	DZ DZ DZ DZ DZ DZ DZ DZ DZ DZ DZ DZ						5.6 6.2 6.8 7.5 8.2 9.1 10 11 12 13 16	20 20 20 10 10 10 10 10 10 10 5.0 5.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	20 20 20 10 10 10 10 10 10 10 5.0 5.0
1N3524 1N3525 1N3526 1N3527 1N3528 1N3529 1N3530 1N3531 1N3532 1N3533 1N3534 1N3535 1N3536	S	1N5248B * 1N5250B * 1N5251B * 1N5252B * 1N5254B * 1N5256B * 1N5257B * 1N5258B * 1N5259B * 1N5260B * 1N5261B *	1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221 1N5221	DZ DZ DZ DZ DZ DZ DZ DZ DZ DZ DZ						18 20 22 24 27 30 33 36 39 43 47	5.0 5.0 5.0 5.0 4.0 4.0 3.0 3.0 3.0 2.0 2.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	5.0 5.0 5.0 5.0 4.0 4.0 3.0 3.0 3.0 2.0 2.0
1N3537 1N3538 1N3539 1N3539A 1N3540 1N3540A 1N3541 1N3541A 1N3542 1N3542A 1N3543 1N3543A 1N3544	S	1M12ZZS10 † Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode Backward Diode		DZ DS DS DS DS DS DS DS DS DS DS DS	150		2.5M	2.0*		12	25	8.3	1.0W
1N3545 1N3546 1N3547 1N3548 1N3549 1N3550 1N3551	S	1N4002 1N4003 1N4004 1N4004 1N4005 1N4005 1N4005	1N4001 1N4001 1N4001 1N4001 1N4001 1N4001 1N4001	R R R R R R DS	100 200 300 400 500 600 180	1.5 1.5 1.5 1.5 1.5 1.5 1.0	0.6 0.6 0.6 0.6 0.6 0.6 50M	0.2 0.2 0.2 0.2 0.2 0.2 1.5	15 15 15 15 15 15 15				
1N3552 1N3553 1N3554 thru 1N3557	S	Varactor Diodes, see Table on Page 1-100 1N821 * Varactor Diodes, see Table on Page 1-100	1N821	DR						6.3	0.01	7.5	-55/100
1N3558 1N3559 1N3560 thru 1N3562 1N3563 1N3564 1N3565 1N3566	S G G S S G S S	Matched Pair of 1N751A's, Zener Diode Tunnel Diodes		DS R DS DS DS R	24 1000 15 6.0 800	1.0 1.2 1.0 2.0 2.25	200M 0.4 40M 2.0A 1.0	20*	40				

Replacement \* denotes exact device type replacement available on request.

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> %	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3567	S			DS	50	1.0	100M	0.05*	2.0				
1N3568	S			DS	80	1.0	20M	1.0*	2.0				
1N3569	S	MR1121 *	MR1120	R	100	1.3	3.5	0.4	35				
1N3570	S	MR1123 *	MR1120	R	200	1.3	3.5	0.4	35				
1N3571	S	MR1123 *	MR1120	R	300	1.3	3.5	0.4	35				
1N3572	S	MR1124 *	MR1120	R	400	1.3	3.5	0.4	35				
1N3573	S	MR1125 *	MR1120	R	500	1.3	3.5	0.4	35				
1N3574	S	MR1126 *	MR1120	R	600	1.3	3.5	0.4	35				
1N3575	S			DS	60	0.74	1.0M	0.75N					
1N3576	S			DS	125	0.74	1.0M	0.75N					
1N3577	S			DS	175	0.74	1.0M	0.75N					
1N3578	S			DS	225	0.74	1.0M	0.75N					
1N3579	S			DS	275	0.74	1.0M	0.75N					
1N3580	S		1N2163	DR						11.7	0.01	7.5	0/75
1N3580A	S		1N2163	DR						11.7	0.01	7.5	-55/100
1N3580B	S		1N2163	DR						11.7	0.01	7.5	-55/150
1N3581	S		1N2163	DR						11.7	0.005	7.5	0/75
1N3581A	S		1N2163	DR						11.7	0.005	7.5	-55/100
1N3581B	S		1N2163	DR						11.7	0.005	7.5	-55/150
1N3582	S		1N2163	DR						11.7	0.002	7.5	0/75
1N3582A	S		1N2163	DR						11.7	0.002	7.5	-55/100
1N3582B	S		1N2163	DR						11.7	0.002	7.5	-55/150
1N3583	S		1N2163	DR						11.7	0.001	7.5	0/75
1N3583A	S		1N2163	DR						11.7	0.001	7.5	-55/100
1N3583B	S		1N2163	DR						11.7	0.001	7.5	-55/150
1N3584	S	1N945 *	1N941	DR						11.7	0.0005	7.5	0/75
1N3584A	S	1N945A *	1N941	DR						11.7	0.0005	7.5	-55/100
1N3584B	S	1N945B *	1N941	DR						11.7	0.0005	7.5	-55/150
1N3585	S	MR1240SB	MR1240	R	50	1.25	400	25	8000				
1N3586	S	MR1241SB	MR1240	R	100	1.25	400	25	8000				
1N3587	S	MR1243SB	MR1240	R	200	1.25	400	25	8000				
1N3588	S	MR1245SB	MR1240	R	300	1.25	400	25	8000				
1N3589	S	MR1247SB	MR1240	R	400	1.25	400	25	8000				
1N3590	S	MR1248SB	MR1240	R	500	1.25	400	25	8000				
1N3591	S	MR1249SB	MR1240	R	600	1.25	400	25	8000				
1N3592	G			DS	30	0.35	2.0M	4.0*	0.04				
1N3593	S			DS	40	1.0	10M	25N	10				
1N3594	S			DS	60	1.0	50M	0.1M	6.0				
1N3595	S			DS	125	1.0	200M	1.0M	3.0				
1N3596	S			DS	20	1.0	30M	0.1*	4.0				
1N3597	S			DS	150	1.2	400M	0.1*	0.3				
1N3598	S			DS	50	0.85	10M	0.1*	4.0				
1N3599	S			DS	150	1.0	100M	0.1*	50				
1N3600	S			DS	50	1.0	200M	100*	6.0				
1N3601	S			DS	75	1.0	10M	0.1*	5.0				
1N3602	S			DS	50	1.0	20M	0.1*	5.0				
1N3603	S			DS	30	1.0	30M	0.1*	5.0				
1N3604	S			DS	75	1.0	50M	0.05*	2.0				
1N3605	S			DS	40	0.55	0.1M	0.05*	2.0				
1N3606	S			DS	75	0.55	0.1M	0.05*	2.0				
1N3607	S			DS	75	1.0	50M	0.05*	2.0				
1N3608	S			DS	40	0.55	0.1M	0.05*	2.0				
1N3609	S			DS	75	0.55	0.1M	0.05*	2.0				
1N3611	S	1N4003	1N4001	DS	200	1.0	750M	10*					
1N3612	S	1N4004	1N4001	DS	400	1.0	750M	10*					
1N3613	S	1N4005	1N4001	DS	600	1.0	750M	10*					
1N3614	S	1N4006	1N4001	DS	800	1.0	750M	10*					
1N3615	S	MR1120	MR1120	R	50	1.2	16	3.0	300				
1N3616	S	MR1121	MR1120	R	100	1.2	16	2.5	300				
1N3617	S	MR1122	MR1120	R	150	1.2	16	2.25	300				
1N3618	S	MR1122	MR1120	R	200	1.2	16	2.0	300				
1N3619	S	MR1123	MR1120	R	300	1.2	16	1.75	300				
1N3620	S	MR1124	MR1120	R	400	1.2	16	1.5	300				
1N3621	S	MR1125	MR1120	R	500	1.2	16	1.25	300				
1N3622	S	MR1126	MR1120	R	600	1.2	16	1.0	300				
1N3623	S	MR1128	MR1120	R	800	1.2	16	0.75	300				
1N3624	S	MR1130	MR1120	R	1000	1.2	16	0.6	300				
1N3625	S			DS	225	1.0	40M	0.5*	0.5				
1N3626	G			DS	50	0.5	10M	1.0M	0.45				
1N3627		Varactor Diodes, see Table on Page 1-100											
1N3628													
1N3629	S			R	100	1.0	0.75	0.01	30				
1N3630	S			R	200	1.0	0.75	0.01	30				
1N3631	S			R	300	1.0	0.75	0.01	30				
1N3632	S			R	400	1.0	0.75	0.01	30				
1N3633	S			R	500	1.0	0.75	0.01	30				
1N3634	S			R	600	1.0	0.75	0.01	30				
1N3635	S			R	700	1.0	0.75	0.01	30				
1N3636	S			R	800	1.0	0.75	0.01	30				
1N3637	S			R	900	1.0	0.75	0.01	30				
1N3638	S			R	1000	1.0	0.75	0.01	30				

Replacement \* denotes exact device type replacement available on request.



**1N3639-1N3689**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N3639	S	1N4003	1N4001	R	200	1.2	0.75	0.2	40				
1N3640	S	1N4004	1N4001	R	400	1.2	0.75	0.2	40				
1N3641	S	1N4005	1N4001	R	600	1.2	0.75	0.2	40				
1N3642	S	1N4006	1N4001	R	800	1.2	0.75	0.2	40				
1N3643	DS			DS	1000	5.0	250M	5.0*					
1N3644	DS			DS	1500	5.0	250M	5.0*					
1N3645	DS			DS	1000	5.0	250M	5.0*					
1N3646	DS			DS	2500	5.0	250M	5.0*					
1N3647	DS			DS	3000	5.0	250M	5.0*					
1N3648	R			R	10K	23	0.35	0.5	30				
1N3649	S	MR1128	MR1120	R	800	1.1	1.0	0.005	25				
1N3650	S	MR1130	MR1120	R	1000	1.1	1.0	0.005	25				
1N3653	S			DS	90	1.0	400M	25N	4.0				
1N3654	S			DS	90	1.0	50M	25N	4.0				
1N3655	S	Microwave S-band Mixer:			NF = 8.3	to 6.0	dB						
1N3655A	S	Microwave S-band Mixer:			NF = 8.3	to 6.0	dB						
1N3655B	S	Microwave S-band Mixer:			NF = 8.3	to 6.0	dB						
1N3656	S			DS	200	1.2	500M	0.01M					
1N3657	S			DS	400	1.2	500M	0.01M					
1N3658	S			DS	600	1.2	500M	0.01M					
1N3659	S			R	50	1.4	25	5.0	400				
1N3660	S			R	100	1.4	25	4.5	400				
1N3661	S			R	200	1.4	25	4.0	400				
1N3662	S			R	300	1.4	25	3.5	400				
1N3663	S			R	400	1.4	25	3.0	400				
1N3664	S			R	500	1.4	25	2.5	400				
1N3665	S			R	600	1.4	25	2.0	400				
1N3666	DS			DS	80	1.0	200M	25*	0.3				
1N3667	S			R	500	1.2	1.5	1.2	30				
1N3668	DS			DS	30	1.0	5.0M	0.1*	0.15				
1N3669	DS			DS	70	1.1	400M	0.25*	0.2				
1N3670	S	MR1128	MR1120	R	700	2.05	12	3.0	200				
1N3670A	S	MR1128	MR1120	R	700	1.5	12	0.9	240				
1N3671	S	MR1128	MR1120	R	800	2.05	12	2.0	200				
1N3671A	S	MR1128	MR1120	R	800	1.3	12	0.8	240				
1N3672	S	MR1130	MR1120	R	900	2.05	12	2.0	200				
1N3672A	S	MR1130	MR1120	R	900	1.15	12	0.7	240				
1N3673	S	MR1130	MR1120	R	1000	2.05	12	1.0	200				
1N3673A	S	MR1130	MR1120	R	1000	1.0	12	0.6	240				
1N3675	S	1N4736 *	1N4728	DZ						6.8		20	750M
1N3675A	S	1N4736 *	1N4728	DZ						6.8	19	10	750M
1N3675B	S	1N4736A *	1N4728	DZ						6.8	19	5.0	750M
1N3676	S	1N4737 *	1N4728	DZ						7.5	17	20	750M
1N3676A	S	1N4737 *	1N4728	DZ						7.5	17	10	750M
1N3676B	S	1N4737A *	1N4728	DZ						7.5	17	5.0	750M
1N3677	S	1N4738 *	1N4728	DZ						8.2	15	20	750M
1N3677A	S	1N4738 *	1N4728	DZ						8.2	15	10	750M
1N3677B	S	1N4738A *	1N4728	DZ						8.2	15	5.0	750M
1N3678	S	1N4739 *	1N4728	DZ						9.1	14	20	750M
1N3678A	S	1N4739 *	1N4728	DZ						9.1	14	10	750M
1N3678B	S	1N4739A *	1N4728	DZ						9.1	14	5.0	750M
1N3679	S	1N4740 *	1N4728	DZ						10	13	20	750M
1N3679A	S	1N4740 *	1N4728	DZ						10	13	10	750M
1N3679B	S	1N4740A *	1N4728	DZ						10	13	5.0	750M
1N3680	S	1N4741 *	1N4728	DZ						11	12	20	750M
1N3680A	S	1N4741 *	1N4728	DZ						11	12	10	750M
1N3680B	S	1N4741A *	1N4728	DZ						11	12	5.0	750M
1N3681	S	1N4742 *	1N4728	DZ						12	11	20	750M
1N3681A	S	1N4742 *	1N4728	DZ						12	11	10	750M
1N3681B	S	1N4742A *	1N4728	DZ						12	11	5.0	750M
1N3682	S	1N4743 *	1N4728	DZ						13	9.5	20	750M
1N3682A	S	1N4743 *	1N4728	DZ						13	9.5	10	750M
1N3682B	S	1N4743A *	1N4728	DZ						13	9.5	5.0	750M
1N3683	S	1N4744 *	1N4728	DZ						15	8.5	20	750M
1N3683A	S	1N4744 *	1N4728	DZ						15	8.5	10	750M
1N3683B	S	1N4744A *	1N4728	DZ						15	8.5	5.0	750M
1N3684	S	1N4745 *	1N4728	DZ						16	7.8	20	750M
1N3684A	S	1N4745 *	1N4728	DZ						16	7.8	10	750M
1N3684B	S	1N4745A *	1N4728	DZ						16	7.8	5.0	750M
1N3685	S	1N4746 *	1N4728	DZ						18	7.0	20	750M
1N3685A	S	1N4746 *	1N4728	DZ						18	7.0	10	750M
1N3685B	S	1N4746A *	1N4728	DZ						18	7.0	5.0	750M
1N3686	S	1N4747 *	1N4728	DZ						20	6.2	20	750M
1N3686A	S	1N4747 *	1N4728	DZ						20	6.2	10	750M
1N3686B	S	1N4747A *	1N4728	DZ						20	6.2	5.0	750M
1N3687	S	1N4748 *	1N4728	DZ						22	5.6	20	750M
1N3687A	S	1N4748 *	1N4728	DZ						22	5.6	10	750M
1N3687B	S	1N4748A *	1N4728	DZ						22	5.6	5.0	750M
1N3688	S	1N4749 *	1N4728	DZ						24	5.2	20	750M
1N3688A	S	1N4749 *	1N4728	DZ						24	5.2	10	750M
1N3688B	S	1N4749A *	1N4728	DZ						24	5.2	5.0	750M
1N3689	S	1N4750 *	1N4728	DZ						27	4.6	20	750M

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)		I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3689A	S	1N4750 *	1N4728	DZ						27	4.6	10	750M
1N3689B	S	1N4750A *	1N4728	DZ						27	4.6	5.0	750M
1N3690	S	1N4751 *	1N4728	DZ						30	4.2	20	750M
1N3690A	S	1N4751 *	1N4728	DZ						30	4.2	10	750M
1N3690B	S	1N4751A *	1N4728	DZ						30	4.2	5.0	750M
1N3691	S	1N4752 *	1N4728	DZ						33	3.8	20	750M
1N3691A	S	1N4752 *	1N4728	DZ						33	3.8	10	750M
1N3691B	S	1N4752A *	1N4728	DZ						33	3.8	5.0	750M
1N3692	S	1N4753 *	1N4728	DZ						36	3.4	20	750M
1N3692A	S	1N4753 *	1N4728	DZ						36	3.4	10	750M
1N3692B	S	1N4753A *	1N4728	DZ						36	3.4	5.0	750M
1N3693	S	1N4754 *	1N4728	DZ						39	3.2	20	750M
1N3693A	S	1N4754 *	1N4728	DZ						39	3.2	10	750M
1N3693B	S	1N4754A *	1N4728	DZ						39	3.2	5.0	750M
1N3694	S	1N4755 *	1N4728	DZ						43	3.0	20	750M
1N3694A	S	1N4755 *	1N4728	DZ						43	3.0	10	750M
1N3694B	S	1N4755A *	1N4728	DZ						43	3.0	5.0	750M
1N3695	S	1N4756 *	1N4728	DZ						47	2.7	20	750M
1N3695A	S	1N4756 *	1N4728	DZ						47	2.7	10	750M
1N3695B	S	1N4756A *	1N4728	DZ						47	2.7	5.0	750M
1N3696	S	1N4757 *	1N4728	DZ						51	2.5	20	750M
1N3696A	S	1N4757 *	1N4728	DZ						51	2.5	10	750M
1N3696B	S	1N4757A *	1N4728	DZ						51	2.5	5.0	750M
1N3697	S	1N4758 *	1N4728	DZ						56	2.2	20	750M
1N3697A	S	1N4758 *	1N4728	DZ						56	2.2	10	750M
1N3697B	S	1N4758A *	1N4728	DZ						56	2.2	5.0	750M
1N3698	S	1N4759 *	1N4728	DZ						62	2.0	20	750M
1N3698A	S	1N4759 *	1N4728	DZ						62	2.0	10	750M
1N3698B	S	1N4759A *	1N4728	DZ						62	2.0	5.0	750M
1N3699	S	1N4760 *	1N4728	DZ						68	1.8	20	750M
1N3699A	S	1N4760 *	1N4728	DZ						68	1.8	10	750M
1N3699B	S	1N4760A *	1N4728	DZ						68	1.8	5.0	750M
1N3700	S	1N4761 *	1N4728	DZ						75	1.7	20	750M
1N3700A	S	1N4761 *	1N4728	DZ						75	1.7	10	750M
1N3700B	S	1N4761A *	1N4728	DZ						75	1.7	5.0	750M
1N3701	S	1N4762 *	1N4728	DZ						82	1.5	20	750M
1N3701A	S	1N4762 *	1N4728	DZ						82	1.5	10	750M
1N3701B	S	1N4762A *	1N4728	DZ						82	1.5	5.0	750M
1N3702	S	1N4763 *	1N4728	DZ						91	1.4	20	750M
1N3702A	S	1N4763 *	1N4728	DZ						91	1.4	10	750M
1N3702B	S	1N4763A *	1N4728	DZ						91	1.4	5.0	750M
1N3703	S	1N4764 *	1N4728	DZ						100	1.3	20	750M
1N3703A	S	1N4764 *	1N4728	DZ						100	1.3	10	750M
1N3703B	S	1N4764A *	1N4782	DZ						100	1.3	5.0	750M
1N3704	S	1M110ZS10 *	1N4728	DZ						110	1.1	20	750M
1N3704A	S	1M110ZS10 *	1N4728	DZ						110	1.1	10	750M
1N3704B	S	1M110ZS5 *	1N4728	DZ						110	1.1	5.0	750M
1N3705	S	1M120ZS10 *	1N4728	DZ						120	1.0	20	750M
1N3705A	S	1M120ZS10 *	1N4728	DZ						120	1.0	10	750M
1N3705B	S	1M120ZS5 *	1N4728	DZ						120	1.0	5.0	750M
1N3706	S	1M130ZS10 *	1N4728	DZ						130	0.95	20	750M
1N3706A	S	1M130ZS10 *	1N4728	DZ						130	0.95	10	750M
1N3706B	S	1M130ZS5 *	1N4728	DZ						130	0.95	5.0	750M
1N3707	S	1M150ZS10 *	1N4728	DZ						150	0.85	20	750M
1N3707A	S	1M150ZS10 *	1N4728	DZ						150	0.85	10	750M
1N3707B	S	1M150ZS5 *	1N4728	DZ						150	0.85	5.0	750M
1N3708	S	1M160ZS10 *	1N4728	DZ						160	0.80	20	750M
1N3708A	S	1M160ZS10 *	1N4728	DZ						160	0.80	10	750M
1N3708B	S	1M160ZS5 *	1N4728	DZ						160	0.80	5.0	750M
1N3709	S	1M180ZS10 *	1N4728	DZ						180	0.68	20	750M
1N3709A	S	1M180ZS10 *	1N4728	DZ						180	0.68	10	750M
1N3709B	S	1M180ZS5 *	1N4728	DZ						200	0.65	20	750M
1N3710	S	1M200ZS10 *	1N4728	DZ						200	0.65	10	750M
1N3710A	S	1M200ZS10 *	1N4728	DZ						200	0.65	5.0	750M
1N3710B	S	1M200ZS5 *	1N4728	DZ						200	0.65	5.0	750M
1N3711	S			R	6000	11	0.15	0.025	5.0				
1N3712													
thru													
1N3721	G	Tunnel Diodes											
1N3722	S			DS	50	1.0	20M	0.1*	10				
1N3723	S			R	1000	2.2	0.75	0.005	12				
1N3724	S			R	1200	2.2	0.75	0.005	12				
1N3725	S			R	1400	2.2	0.75	0.005	12				
1N3726	S			R	1600	2.2	0.75	0.005	12				
1N3727	S			R	1800	2.2	0.75	0.005	12				
1N3728	S			DS	550	1.2	400M	0.1*					
1N3729	S			DS	600	1.0	5.0M	0.1*	0.5				
1N3730	S			DS	80	1.0	750M	0.1*	15				
1N3731	S			DS	80	1.0	100M	5.0*	3.0				
1N3732	S		1N4728	DZ						5.1	40	5.0	1.0W
1N3733	S	Microwave S-band Mixer											
1N3734	S	Photosensitive Device; BV = 100 V, Sensitivity = 0.05 μA/fc											

Replacement \* denotes exact device type replacement available on request.



# 1N3735-1N3795

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>RT</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N3735	S	MR1231SB	MR1230	R	100	1.3	250	16	4500				
1N3736	S	MR1233SB	MR1230	R	200	1.3	250	16	4500				
1N3737	S	MR1235SB	MR1230	R	300	1.3	250	16	4500				
1N3738	S	MR1237SB	MR1230	R	400	1.3	250	16	4500				
1N3739	S	MR1239SB	MR1230	R	500	1.3	250	13	4500				
1N3740	S	MR1239SB	MR1230	R	600	1.3	250	12	4500				
1N3741	S			R	800	1.3	250	9.0	4500				
1N3742	S			R	1000	1.3	250	7.0	4500				
1N3743	S			R	1200	1.3	250	7.0	4500				
1N3744	S			R	1400	1.3	250	7.0	4500				
1N3745	S	Microwave X-band Mixer;	NF = 9.5 dB										
1N3746	S	Microwave X-band Mixer;	NF = 8.5 dB										
1N3747	S	Microwave X-band Mixer;	NF = 7.5 dB										
1N3748	S			R	200	1.5	0.5		20				
1N3749	S			R	400	1.5	0.5		20				
1N3750	S			R	600	1.5	0.5		20				
1N3751	S			R	800	1.5	0.5		20				
1N3752	S			R	1000	1.5	0.5		20				
1N3753	G			DS	55	1.0	150M	5.0*					
1N3754	S			R	100	1.2	0.15	0.3	15				
1N3755	S			R	200	1.2	0.15	0.3	15				
1N3756	S			R	400	1.2	0.15	0.3	15				
1N3757	S			R	200	1.0	1.0		30				
1N3758	S			R	400	1.0	1.0		30				
1N3759	S			R	600	1.0	1.0		30				
1N3760	S			R	800	1.0	1.0		30				
1N3761	S			R	1000	1.0	1.0		30				
1N3762	S			R	5300	12	0.065	0.005	15				
1N3763	S	1N2767A		DR						20	0.002	10	-55/100
1N3764	S			R	3000	6.5	0.2	0.1	8.0				
1N3765	S			R	700	1.8	35	5.0	400				
1N3766	S			R	800	1.8	35	4.0	400				
1N3767	S			R	900	1.8	35	3.0	400				
1N3768	S			R	1000	1.8	35	2.0	400				
1N3769	G			DS	90	0.5	25M	5.0*					
1N3770		Varactor Diode, see Table on Page 1-100											
1N3771		4-Layer Diodes, see Table on Page 1-96											
1N3772				DS	25	0.35	2.0M	4.0*	40	1.15	10	2.0	0.34W
1N3773	G			DZ									
1N3774	S			R	1500	2.2	3.3	0.1	15	10	25	10	6.0W
1N3775	S			DZ									
1N3776	S			DS	40	1.1	10M	0.1*	4.0				
1N3777	S			DS									
1N3778	S	Microwave C-X-band Detector											
1N3779	S	1N821A	1N821	DR						6.5	0.015	7.5	-55/100
1N3780	S	1N821A	1N821	DR						6.5	0.01	7.5	-55/100
1N3781	S	1N823A	1N821	DR						6.5	0.005	7.5	-55/100
1N3782	S	1N825A	1N821	DR						6.5	0.002	7.5	-55/100
1N3783	S	1N827A	1N821	DR						6.5	0.001	7.5	-55/100
1N3784	S	1N829A	1N821	DR						6.5	0.0005	7.5	-55/100
1N3785	S		1N3785	DZ						6.8	55	20	1.5W
1N3785A	S		1N3785	DZ						6.8	55	10	1.5W
1N3785B	S		1N3785	DZ						6.8	55	5.0	1.5W
1N3786	S		1N3785	DZ						7.5	50	20	1.5W
1N3786A	S		1N3785	DZ						7.5	50	10	1.5W
1N3786B	S		1N3785	DZ						7.5	50	5.0	1.5W
1N3787	S		1N3785	DZ						8.2	46	20	1.5W
1N3787A	S		1N3785	DZ						8.2	46	10	1.5W
1N3787B	S		1N3785	DZ						8.2	46	5.0	1.5W
1N3788	S		1N3785	DZ						9.1	41	20	1.5W
1N3788A	S		1N3785	DZ						9.1	41	10	1.5W
1N3788B	S		1N3785	DZ						9.1	41	5.0	1.5W
1N3789	S		1N3785	DZ						10	37	20	1.5W
1N3789A	S		1N3785	DZ						10	37	10	1.5W
1N3789B	S		1N3785	DZ						10	37	5.0	1.5W
1N3790	S		1N3785	DZ						11	34	20	1.5W
1N3790A	S		1N3785	DZ						11	34	10	1.5W
1N3790B	S		1N3785	DZ						11	34	5.0	1.5W
1N3791	S		1N3785	DZ						12	31	20	1.5W
1N3791A	S		1N3785	DZ						12	31	10	1.5W
1N3791B	S		1N3785	DZ						12	31	5.0	1.5W
1N3792	S		1N3785	DZ						13	29	20	1.5W
1N3792A	S		1N3785	DZ						13	29	10	1.5W
1N3792B	S		1N3785	DZ						13	29	5.0	1.5W
1N3793	S		1N3785	DZ						15	25	20	1.5W
1N3793A	S		1N3785	DZ						15	25	10	1.5W
1N3793B	S		1N3785	DZ						15	25	5.0	1.5W
1N3794	S		1N3785	DZ						16	23	20	1.5W
1N3794A	S		1N3785	DZ						16	23	10	1.5W
1N3794B	S		1N3785	DZ						16	23	5.0	1.5W
1N3795	S		1N3785	DZ						18	21	20	1.5W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N3795A	S		1N3785	DZ						18	21	10	1.5W
1N3795B	S		1N3785	DZ						18	21	5.0	1.5W
1N3796	S		1N3785	DZ						20	19	20	1.5W
1N3796A	S		1N3785	DZ						20	19	10	1.5W
1N3796B	S		1N3785	DZ						20	19	5.0	1.5W
1N3797	S		1N3785	DZ						22	17	20	1.5W
1N3797A	S		1N3785	DZ						22	17	10	1.5W
1N3797B	S		1N3785	DZ						22	17	5.0	1.5W
1N3798	S		1N3785	DZ						24	16	20	1.5W
1N3798A	S		1N3785	DZ						24	16	10	1.5W
1N3798B	S		1N3785	DZ						24	16	5.0	1.5W
1N3799	S		1N3785	DZ						27	14	20	1.5W
1N3799A	S		1N3785	DZ						27	14	10	1.5W
1N3799B	S		1N3785	DZ						27	14	5.0	1.5W
1N3800	S		1N3785	DZ						30	12	20	1.5W
1N3800A	S		1N3785	DZ						30	12	10	1.5W
1N3800B	S		1N3785	DZ						30	12	5.0	1.5W
1N3801	S		1N3785	DZ						33	11	20	1.5W
1N3801A	S		1N3785	DZ						33	11	10	1.5W
1N3801B	S		1N3785	DZ						33	11	5.0	1.5W
1N3802	S		1N3785	DZ						36	10	20	1.5W
1N3802A	S		1N3785	DZ						36	10	10	1.5W
1N3802B	S		1N3785	DZ						36	10	5.0	1.5W
1N3803	S		1N3785	DZ						39	10	20	1.5W
1N3803A	S		1N3785	DZ						39	10	10	1.5W
1N3803B	S		1N3785	DZ						39	10	5.0	1.5W
1N3804	S		1N3785	DZ						43	9.0	20	1.5W
1N3804A	S		1N3785	DZ						43	9.0	10	1.5W
1N3804B	S		1N3785	DZ						43	9.0	5.0	1.5W
1N3805	S		1N3785	DZ						47	8.0	20	1.5W
1N3805A	S		1N3785	DZ						47	8.0	10	1.5W
1N3805B	S		1N3785	DZ						47	8.0	5.0	1.5W
1N3806	S		1N3785	DZ						51	7.4	20	1.5W
1N3806A	S		1N3785	DZ						51	7.4	10	1.5W
1N3806B	S		1N3785	DZ						51	7.4	5.0	1.5W
1N3807	S		1N3785	DZ						56	6.7	20	1.5W
1N3807A	S		1N3785	DZ						56	6.7	10	1.5W
1N3807B	S		1N3785	DZ						56	6.7	5.0	1.5W
1N3808	S		1N3785	DZ						62	6.0	20	1.5W
1N3808A	S		1N3785	DZ						62	6.0	10	1.5W
1N3808B	S		1N3785	DZ						62	6.0	5.0	1.5W
1N3809	S		1N3785	DZ						68	5.5	20	1.5W
1N3809A	S		1N3785	DZ						68	5.5	10	1.5W
1N3809B	S		1N3785	DZ						68	5.5	5.0	1.5W
1N3810	S		1N3785	DZ						75	5.0	20	1.5W
1N3810A	S		1N3785	DZ						75	5.0	10	1.5W
1N3810B	S		1N3785	DZ						75	5.0	5.0	1.5W
1N3811	S		1N3785	DZ						82	4.5	20	1.5W
1N3811A	S		1N3785	DZ						82	4.5	10	1.5W
1N3811B	S		1N3785	DZ						82	4.5	5.0	1.5W
1N3812	S		1N3785	DZ						91	4.1	20	1.5W
1N3812A	S		1N3785	DZ						91	4.1	10	1.5W
1N3812B	S		1N3785	DZ						91	4.1	5.0	1.5W
1N3813	S		1N3785	DZ						100	3.7	20	1.5W
1N3813A	S		1N3785	DZ						100	3.7	10	1.5W
1N3813B	S		1N3785	DZ						100	3.7	5.0	1.5W
1N3814	S		1N3785	DZ						110	3.4	20	1.5W
1N3814A	S		1N3785	DZ						110	3.4	10	1.5W
1N3814B	S		1N3785	DZ						110	3.4	5.0	1.5W
1N3815	S		1N3785	DZ						120	3.1	20	1.5W
1N3815A	S		1N3785	DZ						120	3.1	10	1.5W
1N3815B	S		1N3785	DZ						120	3.1	5.0	1.5W
1N3816	S		1N3785	DZ						130	2.9	20	1.5W
1N3816A	S		1N3785	DZ						130	2.9	10	1.5W
1N3816B	S		1N3785	DZ						130	2.9	5.0	1.5W
1N3817	S		1N3785	DZ						150	2.5	20	1.5W
1N3817A	S		1N3785	DZ						150	2.5	10	1.5W
1N3817B	S		1N3785	DZ						150	2.5	5.0	1.5W
1N3818	S		1N3785	DZ						160	2.3	20	1.5W
1N3818A	S		1N3785	DZ						160	2.3	10	1.5W
1N3818B	S		1N3785	DZ						160	2.3	5.0	1.5W
1N3819	S		1N3785	DZ						180	2.1	20	1.5W
1N3819A	S		1N3785	DZ						180	2.1	10	1.5W
1N3819B	S		1N3785	DZ						180	2.1	5.0	1.5W
1N3820	S		1N3785	DZ						200	1.9	20	1.5W
1N3820A	S		1N3785	DZ						200	1.9	10	1.5W
1N3820B	S		1N3785	DZ						200	1.9	5.0	1.5W
1N3821	S		1N3821	DZ						3.3	76	10	1.0W
1N3821A	S		1N3821	DZ						3.3	76	5.0	1.0W
1N3822	S		1N3821	DZ						3.6	69	10	1.0W
1N3822A	S		1N3821	DZ						3.6	69	5.0	1.0W
1N3823	S		1N3821	DZ						3.9	64	10	1.0W



**1N3823A-1N3921**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)	I <sub>R</sub>	t <sub>rr</sub> (μs)		V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3823A	S		1N3821	DZ						3.9	64	5.0	1.0W
1N3824	S		1N3821	DZ						4.3	58	10	1.0W
1N3824A	S		1N3821	DZ						4.3	58	5.0	1.0W
1N3825	S		1N3821	DZ						4.7	53	10	1.0W
1N3825A	S		1N3821	DZ						4.7	53	5.0	1.0W
1N3826	S		1N3821	DZ						5.1	49	10	1.0W
1N3826A	S		1N3821	DZ						5.1	49	5.0	1.0W
1N3827	S		1N3821	DZ						5.6	45	10	1.0W
1N3827A	S		1N3821	DZ						5.6	45	5.0	1.0W
1N3828	S		1N3821	DZ						6.2	41	10	1.0W
1N3828A	S		1N3821	DZ						6.2	41	5.0	1.0W
1N3829	S		1N3821	DZ						6.8	37	10	1.0W
1N3829A	S		1N3821	DZ						6.8	37	5.0	1.0W
1N3830	S		1N3821	DZ						7.5	34	10	1.0W
1N3830A	S		1N3821	DZ						7.5	34	5.0	1.0W
1N3831													
thru													
1N3846													
1N3847													
thru													
1N3860	G	Tunnel Diodes											
1N3861	G	Tunnel Rectifier											
1N3862	G	Tunnel Rectifier											
1N3863	G	Tunnel Rectifier											
1N3864	S			DS	125	1.5	200M	1.0N	0.9				
1N3865	G			DS	80		100M	15*	0.5				
1N3866	S			R	200	1.5	1.0	0.05	25				
1N3867	S			R	400	1.5	1.0	0.05	25				
1N3868	S			R	600	1.5	1.0	0.05	25				
1N3869	S			R	1000	3.0	0.5	0.05	10				
1N3870	S			R	1500	3.0	0.5	0.05	10				
1N3871	S			R	2500	6.0	0.25	0.05	5.0				
1N3872	S			DS	90	1.0	150M	0.1*	15				
1N3873	S			DS	50	1.14	0.2A	0.1*	4.0				
1N3874	S			R	50	1.5	6.0	3.0	75				
1N3875	S			R	100	1.5	6.0	3.0	75				
1N3876	S			R	200	1.5	6.0	3.0	75				
1N3877	S			R	300	1.5	6.0	3.0	75				
1N3878	S			R	400	1.5	6.0	3.0	75				
1N3879	S		1N3879	.R	50	1.5	6.0	3.0	150				
1N3880	S		1N3879	.R	150	1.5	6.0	3.0	150				
1N3881	S		1N3879	.R	200	1.5	6.0	3.0	150				
1N3882	S		1N3879	.R	300	1.5	6.0	3.0	150				
1N3883	S		1N3879	.R	400	1.5	6.0	3.0	150				
1N3884	S			R	50	1.5	12	3.0	150				
1N3885	S			R	100	1.5	12	3.0	150				
1N3886	S			R	200	1.5	12	3.0	150				
1N3887	S			R	300	1.5	12	3.0	150				
1N3888	S			R	400	1.5	12	3.0	150				
1N3889	S		1N3889	.R	50	1.5	12	3.0	200				
1N3890	S		1N3889	.R	100	1.5	12	3.0	200				
1N3891	S		1N3889	.R	200	1.5	12	3.0	200				
1N3892	S		1N3889	.R	300	1.5	12	3.0	200				
1N3893	S		1N3889	.R	400	1.5	12	3.0	200				
1N3894	S			DS	400	1.0	400M	0.2*					
1N3895	S			DS	350	1.0	200M	0.5*					
1N3896	S			DZ						0.77	50	5.0	250M
1N3897	S			DZ						1.5	30	5.0	250M
1N3898	S			DZ						2.0	20	5.0	250M
1N3899	S	1N5221B	1N5221	DZ									
			1N3899	.R	50	1.5	20	6.0	250				
1N3900	S		1N3899	.R	100	1.5	20	6.0	250				
1N3901	S		1N3899	.R	200	1.5	20	6.0	250				
1N3902	S		1N3899	.R	300	1.5	20	6.0	250				
1N3903	S		1N3899	.R	400	1.5	20	6.0	250				
1N3904	S			R	50	1.5	20	6.0	225				
1N3905	S			R	100	1.5	20	6.0	225				
1N3906	S			R	200	1.5	20	6.0	225				
1N3907	S			R	300	1.5	20	6.0	225				
1N3908	S			R	400	1.5	20	6.0	225				
1N3909	S		1N3909	.R	50	1.5	30	10	300				
1N3910	S		1N3909	.R	100	1.5	30	10	300				
1N3911	S		1N3909	.R	200	1.5	30	10	300				
1N3912	S		1N3909	.R	300	1.5	30	10	300				
1N3913	S		1N3909	.R	400	1.5	30	10	300				
1N3914	S			R	50	1.5	30	10	300				
1N3915	S			R	100	1.5	30	10	300				
1N3916	S			R	200	1.5	30	10	300				
1N3917	S			R	300	1.5	30	10	300				
1N3918	S			R	400	1.5	30	10	300				
1N3919	S			R	1000	2.0	5.0	0.5	100				
1N3920	S			R	1500	2.0	5.0	0.5	100				
1N3921	S			R	2000	2.0	5.0	0.5	100				

.R t<sub>rr</sub> @ 200 ns



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3922	S			R	2500	2.0	5.0	0.5	100				
1N3923	S			R	3000	2.0	5.0	0.5	100				
1N3924	S			R	1000	2.0	10	0.5	100				
1N3925	S			R	1500	2.0	10	0.5	100				
1N3926	S			R	2000	2.0	10	0.5	100				
1N3927	S			R	2500	2.0	10	0.5	100				
1N3928	S			R	3000	2.0	10	0.5	100				
1N3929	S			DS	1000	2.0	1.0A	10*					
1N3930	S			DS	1500	2.0	1.0A	10*					
1N3931	S			DS	2000	2.0	1.0A	10*					
1N3932	S			DS	1500	2.0	1.0A	10*					
1N3933	S			DS	3000	2.0	1.0A	10*					
1N3934	S			R	1200	2.5	1.0	0.4	50				
1N3935					4-Layer Diodes, see Table on Page 1-96								
thru													
1N3937													
1N3938	S			R	200	1.1	2.0	0.4	30				
1N3939	S			R	400	1.1	2.0	0.2	30				
1N3940	S			R	600	1.1	2.0	0.2	30				
1N3941	S			R	800	1.5	2.0	0.2	30				
1N3942	S			R	1000	1.5	2.0	0.2	30				
1N3943	S			DS	3.0	2.5	300M	100*					
1N3944	G			DS	15	0.75	10M	2.5*	12				
1N3945													
thru					Varactor Diodes, see Table on Page 1-100								
1N3947													
1N3948	S	Tunnel Diode											
1N3949	S	1N2984B	1N2970	DZ						20	250	5.0	10W
1N3950	S	1N3796B	1N3785	DZ						20	19	5.0	1.5W
1N3951	S	1.5M25Z5 †		DZ						25	15	5.0	1.5W
1N3952	S			DS	130	0.74	10M	25*					
1N3953	G			DS	40	0.5	35M	50*	300				
1N3954	S			DS	50	1.0	200M	0.1*	4.0				
1N3955	S			R	100	1.3	70	15	1200				
1N3956	S			DS	40	0.55	100*	0.05*	2.0				
1N3957	S			DS	1000	1.0	400M	10*					
1N3958	S	1N3880	1N4933	R	100	1.3	3.5	0.4	35				
1N3959	S	1N3881	1N4933	R	200	1.3	3.5	0.4	35				
1N3960	S	1N3882	1N4933	R	300	1.3	3.5	0.4	35				
1N3961	S	1N3883	1N4933	R	400	1.3	3.5	0.4	35				
1N3962	S	1N1366	1N4933	R	500	1.3	3.5	0.4	35				
1N3963	S	MR1366	1N4933	R	600	1.3	3.5	0.4	35				
1N3964	S	MR1366		R	200	1.6	22	1.0	200				
1N3965	S			R	400	1.6	22	1.0	200				
1N3966	S			R	600	1.6	22	1.0	200				
1N3967	S			R	800	1.6	22	1.0	200				
1N3968	S			R	200	1.6	50	2.0	600				
1N3969	S			R	400	1.6	50	2.0	600				
1N3970	S			R	600	1.6	50	2.0	600				
1N3971	S			R	800	1.6	50	2.0	600				
1N3972	S			R	200	1.5	104	5.0	1500				
1N3973	S			R	400	1.5	104	5.0	1500				
1N3974	S			R	600	1.5	104	5.0	1500				
1N3975	S			R	800	1.5	104	5.0	1500				
1N3976	S			R	200	1.5	250	10	4000				
1N3977	S			R	400	1.5	250	10	4000				
1N3978	S			R	600	1.5	250	10	4000				
1N3979	S			R	800	1.5	250	10	4000				
1N3981	S			DS	200	1.0	900M	0.01M					
1N3982	S			DS	400	1.0	900M	0.01M					
1N3983	S			DS	600	1.0	900M	0.01M					
1N3984	S	1N3997A	1N3993	DZ						5.5	1000	5.0	10W
1N3985	S	1N3998A	1N3993	DZ						6.0	1000	5.0	10W
1N3986	S	1N3998A	1N3993	DZ						6.2	805	5.0	10W
1N3987	S			R	700	1.4	6.0	0.9	150				
1N3988	S	MR1128	MR1120	R	800	1.4	6.0	0.8	150				
1N3989	S	MR1130	MR1120	R	900	1.4	6.0	0.7	150				
1N3990	S	MR1130	MR1120	R	1000	1.4	6.0	0.6	150				
1N3991	G			DS	35	0.55	30M	1.0M	1.0				
1N3992	S			DS	4000	5.0	250M	5.0*					
1N3993	S		1N3993	DZ						3.9	640	10	10W
1N3993A	S		1N3993	DZ						3.9	640	5.0	10W
1N3994	S		1N3993	DZ						4.3	580	10	10W
1N3994A	S		1N3993	DZ						4.3	580	5.0	10W
1N3995	S		1N3993	DZ						4.7	530	10	10W
1N3995A	S		1N3993	DZ						4.7	530	5.0	10W
1N3996	S		1N3993	DZ						5.1	490	10	10W
1N3996A	S		1N3993	DZ						5.1	490	5.0	10W
1N3997	S		1N3993	DZ						5.6	445	10	10W
1N3997A	S		1N3993	DZ						5.6	445	5.0	10W
1N3998	S		1N3993	DZ						6.2	405	10	10W
1N3998A	S		1N3993	DZ						6.2	405	5.0	10W

†See page 1-1a for ordering information.



**1N3999-1N4036B**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N3999	S		1N3993	DZ						6.8	370	10	10W
1N3999A	S		1N3993	DZ						6.8	370	5.0	10W
1N4000	S		1N3993	DZ						7.5	335	10	10W
1N4000A	S		1N3993	DZ						7.5	335	5.0	10W
1N4001	S		1N4001	R	50	1.1	1.0	0.03	30				
1N4002	S		1N4001	R	100	1.1	1.0	0.03	30				
1N4003	S		1N4001	R	200	1.1	1.0	0.03	30				
1N4004	S		1N4001	R	400	1.1	1.0	0.03	30				
1N4005	S		1N4001	R	600	1.1	1.0	0.03	30				
1N4006	S		1N4001	R	800	1.1	1.0	0.03	30				
1N4007	S		1N4001	R	1000	1.1	1.0	0.03	30				
1N4008	G			DS	12	0.5	10M	0.1M	70				
1N4009	S			DS	25	1.0	30M	0.1M	4.0				
1N4010	S	1N821	1N821	DR						6.2	0.01	7.5	25/100
1N4011	S			R	1000	1.1	0.5	0.2	30				
1N4012	S			R	700	1.3	12	1.0	200				
1N4013	S			R	800	1.3	12	1.0	200				
1N4014	S			R	900	1.3	12	1.0	200				
1N4015	S			R	1000	1.3	12	1.0	200				
1N4016	S	1N2972	1N2970	DZ						8.2	150	20	5.0W
1N4016A	S	1N2972A	1N2970	DZ						8.2	150	10	5.0W
1N4016B	S	1N2972B	1N2970	DZ						8.2	150	5.0	5.0W
1N4017	S	1N2973	1N2970	DZ						9.1	135	20	5.0W
1N4017A	S	1N2973A	1N2970	DZ						9.1	135	10	5.0W
1N4017B	S	1N2973B	1N2970	DZ						9.1	135	5.0	5.0W
1N4018	S	1N2974	1N2970	DZ						10	125	20	5.0W
1N4018A	S	1N2974A	1N2970	DZ						10	125	10	5.0W
1N4018B	S	1N2974B	1N2970	DZ						10	125	5.0	5.0W
1N4019	S	1N2975	1N2970	DZ						11	115	20	5.0W
1N4019A	S	1N2975A	1N2970	DZ						11	115	10	5.0W
1N4019B	S	1N2975B	1N2970	DZ						11	115	5.0	5.0W
1N4020	S	1N2976	1N2970	DZ						12	105	20	5.0W
1N4020A	S	1N2976A	1N2970	DZ						12	105	10	5.0W
1N4020B	S	1N2976B	1N2970	DZ						12	105	5.0	5.0W
1N4021	S	1N2977	1N2970	DZ						13	95	20	5.0W
1N4021A	S	1N2977A	1N2970	DZ						13	95	10	5.0W
1N4021B	S	1N2977B	1N2970	DZ						13	95	5.0	5.0W
1N4022	S	1N2979	1N2970	DZ						15	85	20	5.0W
1N4022A	S	1N2979A	1N2970	DZ						15	85	10	5.0W
1N4022B	S	1N2979B	1N2970	DZ						15	85	5.0	5.0W
1N4023	S	1N2980	1N2970	DZ						16	80	20	5.0W
1N4023A	S	1N2980A	1N2970	DZ						16	80	10	5.0W
1N4023B	S	1N2980B	1N2970	DZ						16	80	5.0	5.0W
1N4024	S	1N2982	1N2970	DZ						18	70	20	5.0W
1N4024A	S	1N2982A	1N2970	DZ						18	70	10	5.0W
1N4024B	S	1N2982B	1N2970	DZ						18	70	5.0	5.0W
1N4025	S	1N2984	1N2970	DZ						20	65	20	5.0W
1N4025A	S	1N2984A	1N2970	DZ						20	65	10	5.0W
1N4025B	S	1N2984B	1N2970	DZ						20	65	5.0	5.0W
1N4026	S	1N2985	1N2970	DZ						22	55	20	5.0W
1N4026A	S	1N2985A	1N2970	DZ						22	55	10	5.0W
1N4026B	S	1N2985B	1N2970	DZ						22	55	5.0	5.0W
1N4027	S	1N2986	1N2970	DZ						24	50	20	5.0W
1N4027A	S	1N2986A	1N2970	DZ						24	50	10	5.0W
1N4027B	S	1N2986B	1N2970	DZ						24	50	5.0	5.0W
1N4028	S	1N2988	1N2970	DZ						27	45	20	5.0W
1N4028A	S	1N2988A	1N2970	DZ						27	45	10	5.0W
1N4028B	S	1N2988B	1N2970	DZ						27	45	5.0	5.0W
1N4029	S	1N2989	1N2970	DZ						30	42	20	5.0W
1N4029A	S	1N2989A	1N2970	DZ						30	42	10	5.0W
1N4029B	S	1N2989B	1N2970	DZ						30	42	5.0	5.0W
1N4030	S	1N2990	1N2970	DZ						33	38	20	5.0W
1N4030A	S	1N2990A	1N2970	DZ						33	38	10	5.0W
1N4030B	S	1N2990B	1N2970	DZ						33	38	5.0	5.0W
1N4031	S	1N2991	1N2970	DZ						36	35	20	5.0W
1N4031A	S	1N2991A	1N2970	DZ						36	35	10	5.0W
1N4031B	S	1N2992B	1N2970	DZ						36	35	5.0	5.0W
1N4032	S	1N2992	1N2970	DZ						39	32	20	5.0W
1N4032A	S	1N2992A	1N2970	DZ						39	32	10	5.0W
1N4032B	S	1N2992B	1N2970	DZ						39	32	5.0	5.0W
1N4033	S	1N2993	1N2970	DZ						43	29	20	5.0W
1N4033A	S	1N2993A	1N2970	DZ						43	29	10	5.0W
1N4033B	S	1N2993B	1N2970	DZ						43	29	5.0	5.0W
1N4034	S	1N2995	1N2970	DZ						47	27	20	5.0W
1N4034A	S	1N2995A	1N2970	DZ						47	27	10	5.0W
1N4034B	S	1N2995B	1N2970	DZ						47	27	5.0	5.0W
1N4035	S	1N2997	1N2970	DZ						51	25	20	5.0W
1N4035A	S	1N2997A	1N2970	DZ						51	25	10	5.0W
1N4035B	S	1N2997B	1N2970	DZ						51	25	5.0	5.0W
1N4036	S	1N2999	1N2970	DZ						56	22	20	5.0W
1N4036A	S	1N2999A	1N2970	DZ						56	22	10	5.0W
1N4036B	S	1N2999B	1N2970	DZ						56	22	5.0	5.0W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> %	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4037	S	1N3000	1N2970	DZ						62	20	20	5.0W
1N4037A	S	1N3000A	1N2970	DZ						62	20	10	5.0W
1N4037B	S	1N3000B	1N2970	DZ						62	20	5.0	5.0W
1N4038	S	1N3001	1N2970	DZ						68	18	20	5.0W
1N4038A	S	1N3001A	1N2970	DZ						68	18	10	5.0W
1N4038B	S	1N3001B	1N2970	DZ						68	18	5.0	5.0W
1N4039	S	1N3002	1N2970	DZ						75	17	20	5.0W
1N4039A	S	1N3002A	1N2970	DZ						75	17	10	5.0W
1N4039B	S	1N3002B	1N2970	DZ						75	17	5.0	5.0W
1N4040	S	1N3003	1N2970	DZ						82	15	20	5.0W
1N4040A	S	1N3003A	1N2970	DZ						82	15	10	5.0W
1N4040B	S	1N3003B	1N2970	DZ						82	15	5.0	5.0W
1N4041	S	1N3004	1N2970	DZ						91	14	20	5.0W
1N4041A	S	1N3004A	1N2970	DZ						91	14	10	5.0W
1N4041B	S	1N3004B	1N2970	DZ						91	14	5.0	5.0W
1N4042	S	1N3005	1N2970	DZ						100	13	20	5.0W
1N4042A	S	1N3005A	1N2970	DZ						100	13	10	5.0W
1N4042B	S	1N3005B	1N2970	DZ						100	13	5.0	5.0W
1N4043	S			DS	25	1.0	275	0.1*	2.0				
1N4044	S	MR1230SB	MR1230	R	50	1.35	275	15	5000				
1N4045	S	MR1231SB	MR1230	R	100	1.35	275	15	5000				
1N4046	S	MR1232SB	MR1230	R	150	1.35	275	15	5000				
1N4047	S	MR1233SB	MR1230	R	200	1.35	275	15	5000				
1N4048	S	MR1234SB	MR1230	R	250	1.35	275	15	5000				
1N4049	S	MR1235SB	MR1230	R	300	1.35	275	15	5000				
1N4050	S	MR1237SB	MR1230	R	400	1.35	275	15	5000				
1N4051	S	MR1238SB	MR1230	R	500	1.35	275	15	5000				
1N4052	S	MR1239SB	MR1230	R	600	1.35	275	15	5000				
1N4053	S			R	700	1.35	275	15	5000				
1N4054	S			R	800	1.35	275	15	5000				
1N4055	S			R	900	1.35	275	15	5000				
1N4056	S			R	1000	1.35	275	15	5000				
1N4057	S		1N429	DR						12.4	0.005	10	-55/100
1N4057A	S		1N429	DR						12.4	0.002	10	-55/100
1N4058	S		1N429	DR						14.6	0.005	10	-55/100
1N4058A	S		1N429	DR						14.6	0.002	10	-55/100
1N4059	S		1N429	DR						16.8	0.005	10	-55/100
1N4059A	S		1N429	DR						16.8	0.002	10	-55/100
1N4060	S		1N429	DR						18.5	0.005	10	-55/100
1N4060A	S		1N429	DR						18.5	0.002	10	-55/100
1N4061	S		1N429	DR						21	0.005	10	-55/100
1N4061A	S		1N429	DR						21	0.002	10	-55/100
1N4062	S		1N429	DR						23	0.005	10	-55/100
1N4062A	S		1N429	DR						23	0.002	10	-55/100
1N4063	S		1N429	DR						27	0.005	10	-55/100
1N4063A	S		1N429	DR						27	0.002	10	-55/100
1N4064	S		1N429	DR						30	0.005	10	-55/100
1N4064A	S		1N429	DR						30	0.002	10	-55/100
1N4065	S		1N429	DR						33	0.005	10	-55/100
1N4065A	S		1N429	DR						33	0.002	10	-55/100
1N4066	S		1N429	DR						37	0.005	7.5	-55/100
1N4066A	S		1N429	DR						37	0.002	7.5	-55/100
1N4067	S		1N429	DR						43	0.005	7.5	-55/100
1N4067A	S		1N429	DR						43	0.002	7.5	-55/100
1N4068	S		1N429	DR						47	0.005	7.5	-55/100
1N4068A	S		1N429	DR						47	0.002	7.5	-55/100
1N4069	S		1N429	DR						51	0.005	7.5	-55/100
1N4069A	S		1N429	DR						51	0.002	7.5	-55/100
1N4070	S		1N429	DR						56	0.005	7.5	-55/100
1N4070A	S		1N429	DR						56	0.002	7.5	-55/100
1N4071	S		1N429	DR						62	0.005	7.5	-55/100
1N4071A	S		1N429	DR						62	0.002	7.5	-55/100
1N4072	S		1N429	DR						68	0.005	5.0	-55/100
1N4072A	S		1N429	DR						68	0.002	5.0	-55/100
1N4073	S		1N429	DR						75	0.005	5.0	-55/100
1N4073A	S		1N429	DR						75	0.002	5.0	-55/100
1N4074	S		1N429	DR						82	0.005	5.0	-55/100
1N4074A	S		1N429	DR						82	0.002	5.0	-55/100
1N4075	S		1N429	DR						87	0.005	5.0	-55/100
1N4075A	S		1N429	DR						87	0.002	5.0	-55/100
1N4076	S		1N429	DR						91	0.005	5.0	-55/100
1N4076A	S		1N429	DR						91	0.002	5.0	-55/100
1N4077	S		1N429	DR						100	0.002	5.0	-55/100
1N4077A	S		1N429	DR						100	0.002	5.0	-55/100
1N4078	S		1N429	DR						105	0.005	2.5	-55/100
1N4078A	S		1N429	DR						105	0.002	2.5	-55/100
1N4079	S		1N429	DR						110	0.005	2.5	-55/100
1N4079A	S		1N429	DR						110	0.002	2.5	-55/100
1N4080	S		1N429	DR						120	0.005	2.5	-55/100
1N4080A	S		1N429	DR						120	0.002	2.5	-55/100
1N4081	S		1N429	DR						130	0.005	2.5	-55/100
1N4081A	S		1N429	DR						130	0.002	2.5	-55/100



**1N4082-1N4158A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4082	S		1N429	DR						140	0.005	25	-55/100
1N4082A	S		1N429	DR						140	0.002	25	-55/100
1N4083	S		1N429	DR						150	0.005	25	-55/100
1N4083A	S		1N429	DR						150	0.002	25	-55/100
1N4084	S		1N429	DR						175	0.005	25	-55/100
1N4084A	S		1N429	DR						175	0.002	25	-55/100
1N4085	S		1N429	DR						200	0.005	25	-55/100
1N4085A	S		1N429	DR						200	0.002	25	-55/100
1N4086	S			DS	70	1.0	200M	0.25M	200				
1N4087	S			DS	50	0.975	30M	90N	2.5				
1N4088	G			DS	30	1.0	100M	0.2M					
1N4089	S			R*	400	1.2	400	0.2	75				
1N4090	G	Backward Diode											
1N4091		Varactor Diode, see Table on Page 1-100											
1N4092	S			DS		1.0	5.0M	1.0*					
1N4093	S			DS	50	1.0	5.0M	1.0					
1N4094	S	1N2624B	1N2620	DR						9.6			
1N4095	S	1N5231A	1N5221	DZ						5.0	5.0	10	330M
1N4096	S	1N4763A	1N4728	DZ						90	8.0	5.0	3.0W
1N4097	S	1N4764A	1N4728	DZ						100	5.0	5.0	3.0W
1N4098	S	1M150ZS5	1N4728	DZ						150	5.0	5.0	3.0W
1N4099	S		1N4099	DZ						6.8	0.25	5.0	250M
1N4100	S		1N4099	DZ						7.5	0.25	5.0	250M
1N4101	S		1N4099	DZ						8.2	0.25	5.0	250M
1N4102	S		1N4099	DZ						8.7	0.25	5.0	250M
1N4103	S		1N4099	DZ						9.1	0.25	5.0	250M
1N4104	S		1N4099	DZ						10	0.25	5.0	250M
1N4105	S		1N4099	DZ						11	0.25	5.0	250M
1N4106	S		1N4099	DZ						12	0.25	5.0	250M
1N4107	S		1N4099	DZ						13	0.25	5.0	250M
1N4108	S		1N4099	DZ						14	0.25	5.0	250M
1N4109	S		1N4099	DZ						15	0.25	5.0	250M
1N4110	S		1N4099	DZ						16	0.25	5.0	250M
1N4111	S		1N4099	DZ						17	0.25	5.0	250M
1N4112	S		1N4099	DZ						18	0.25	5.0	250M
1N4113	S		1N4099	DZ						19	0.25	5.0	250M
1N4114	S		1N4099	DZ						20	0.25	5.0	250M
1N4115	S		1N4099	DZ						22	0.25	5.0	250M
1N4116	S		1N4099	DZ						24	0.25	5.0	250M
1N4117	S		1N4099	DZ						25	0.25	5.0	250M
1N4118	S		1N4099	DZ						27	0.25	5.0	250M
1N4119	S		1N4099	DZ						28	0.25	5.0	250M
1N4120	S		1N4099	DZ						30	0.25	5.0	250M
1N4121	S		1N4099	DZ						33	0.25	5.0	250M
1N4122	S		1N4099	DZ						36	0.25	5.0	250M
1N4123	S		1N4099	DZ						39	0.25	5.0	250M
1N4124	S		1N4099	DZ						43	0.25	5.0	250M
1N4125	S		1N4099	DZ						47	0.25	5.0	250M
1N4126	S		1N4099	DZ						51	0.25	5.0	250M
1N4127	S		1N4099	DZ						56	0.25	5.0	250M
1N4128	S		1N4099	DZ						60	0.25	5.0	250M
1N4129	S		1N4099	DZ						62	0.25	5.0	250M
1N4130	S		1N4099	DZ						68	0.25	5.0	250M
1N4131	S		1N4099	DZ						75	0.25	5.0	250M
1N4132	S		1N4099	DZ						82	0.25	5.0	250M
1N4133	S		1N4099	DZ						87	0.25	5.0	250M
1N4134	S		1N4099	DZ						91	0.25	5.0	250M
1N4135	S		1N4099	DZ						100	0.25	5.0	250M
1N4136	S			R	200	1.6	70	16	750				
1N4137	S			R	400	1.6	70	12	750				
1N4138	S			R	600	1.6	70	8.0	750				
1N4139	S	1N4719	1N4719	R	50	1.0	3.0	0.1	300				
1N4140	S	1N4720	1N4719	R	100	1.0	3.0	0.1	300				
1N4141	S	1N4721	1N4719	R	200	1.0	3.0	0.1	300				
1N4142	S	1N4722	1N4719	R	400	1.0	3.0	0.1	300				
1N4143	S	1N4723	1N4719	R	600	1.0	3.0	0.1	300				
1N4144	S	1N4724	1N4719	R	800	1.0	3.0	0.1	300				
1N4145	S	1N4725	1N4719	R	1000	1.0	3.0	0.1	300				
1N4146	S			R	1200	1.0	3.0	0.1	300				
1N4147	S			DS	30	1.0	30M	0.1*	10				
1N4148	S			DS	75	1.0	10M	25N	4.0				
1N4149	S			DS	75	1.0	10M	25N	4.0				
1N4150	S			DS	50	1.0	200M	0.1*	6.0				
1N4151	S			DS	50	1.0	50M	50N	2.0				
1N4152	S			DS	30	0.88	20M	50N	2.0				
1N4153	S			DS	50	0.88	20M	50N	2.0				
1N4154	S			DS	25	1.0	30M	0.1*	4.0				
1N4155	S			DS	400	1.0	100M	0.1*	10				
1N4156	S			DS	20	1.84	0.1A	50N					
1N4157	S			DS	20	2.66	0.1A	50N					
1N4158	S	1N4736	1N4728	DZ						6.8	37	20	1.0W
1N4158A	S	1N4736	1N4728	DZ						6.8	37	10	1.0W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4158B	S	1N4736A	1N4728	DZ						6.8	37	5.0	1.0W
1N4159	S	1N4737	1N4728	DZ						7.5	34	20	1.0W
1N4159A	S	1N4737	1N4728	DZ						7.5	34	10	1.0W
1N4159B	S	1N4737A	1N4728	DZ						7.5	34	5.0	1.0W
1N4160	S	1N4738	1N4728	DZ						8.2	31	20	1.0W
1N4160A	S	1N4738	1N4728	DZ						8.2	31	10	1.0W
1N4160B	S	1N4738A	1N4728	DZ						8.2	31	5.0	1.0W
1N4161	S	1N4739	1N4728	DZ						9.1	28	20	1.0W
1N4161A	S	1N4739	1N4728	DZ						9.1	28	10	1.0W
1N4161B	S	1N4739A	1N4728	DZ						9.1	28	5.0	1.0W
1N4162	S	1N4740	1N4728	DZ						10	25	20	1.0W
1N4162A	S	1N4740	1N4728	DZ						10	25	10	1.0W
1N4162B	S	1N4740A	1N4728	DZ						10	25	5.0	1.0W
1N4163	S	1N4741	1N4728	DZ						11	23	20	1.0W
1N4163A	S	1N4741	1N4728	DZ						11	23	10	1.0W
1N4163B	S	1N4741A	1N4728	DZ						11	23	5.0	1.0W
1N4164	S	1N4742	1N4728	DZ						12	21	20	1.0W
1N4164A	S	1N4742	1N4728	DZ						12	21	10	1.0W
1N4164B	S	1N4742A	1N4728	DZ						12	21	5.0	1.0W
1N4165	S	1N4743	1N4728	DZ						13	19	20	1.0W
1N4165A	S	1N4743	1N4728	DZ						13	19	10	1.0W
1N4165B	S	1N4743A	1N4728	DZ						13	19	5.0	1.0W
1N4166	S	1N4744	1N4728	DZ						15	17	20	1.0W
1N4166A	S	1N4744	1N4728	DZ						15	17	10	1.0W
1N4166B	S	1N4744A	1N4728	DZ						15	17	5.0	1.0W
1N4167	S	1N4745	1N4728	DZ						16	16	20	1.0W
1N4167A	S	1N4745	1N4728	DZ						16	16	10	1.0W
1N4167B	S	1N4745A	1N4728	DZ						16	16	5.0	1.0W
1N4168	S	1N4746	1N4728	DZ						18	14	20	1.0W
1N4168A	S	1N4746	1N4728	DZ						18	14	10	1.0W
1N4168B	S	1N4746A	1N4728	DZ						18	14	5.0	1.0W
1N4169	S	1N4747	1N4728	DZ						20	13	20	1.0W
1N4169A	S	1N4747	1N4728	DZ						20	13	10	1.0W
1N4169B	S	1N4747A	1N4728	DZ						20	13	5.0	1.0W
1N4170	S	1N4748	1N4728	DZ						22	12	20	1.0W
1N4170A	S	1N4748	1N4728	DZ						22	12	10	1.0W
1N4170B	S	1N4748A	1N4728	DZ						22	12	5.0	1.0W
1N4171	S	1N4749	1N4728	DZ						24	11	20	1.0W
1N4171A	S	1N4749	1N4728	DZ						24	11	10	1.0W
1N4171B	S	1N4749A	1N4728	DZ						24	11	5.0	1.0W
1N4172	S	1N4750	1N4728	DZ						27	9.5	20	1.0W
1N4172A	S	1N4750	1N4728	DZ						27	9.5	10	1.0W
1N4172B	S	1N4750A	1N4728	DZ						27	9.5	5.0	1.0W
1N4173	S	1N4751	1N4728	DZ						30	8.5	20	1.0W
1N4173A	S	1N4751	1N4728	DZ						30	8.5	10	1.0W
1N4173B	S	1N4751A	1N4728	DZ						30	8.5	5.0	1.0W
1N4174	S	1N4752	1N4728	DZ						33	7.5	20	1.0W
1N4174A	S	1N4752	1N4728	DZ						33	7.5	10	1.0W
1N4174B	S	1N4752A	1N4728	DZ						33	7.5	5.0	1.0W
1N4175	S	1N4753	1N4728	DZ						36	7.0	20	1.0W
1N4175A	S	1N4753	1N4728	DZ						36	7.0	10	1.0W
1N4175B	S	1N4753A	1N4728	DZ						36	7.0	5.0	1.0W
1N4176	S	1N4754	1N4728	DZ						39	6.5	20	1.0W
1N4176A	S	1N4754	1N4728	DZ						39	6.5	10	1.0W
1N4176B	S	1N4754A	1N4728	DZ						39	6.5	5.0	1.0W
1N4177	S	1N4755	1N4728	DZ						43	6.0	20	1.0W
1N4177A	S	1N4755	1N4728	DZ						43	6.0	10	1.0W
1N4177B	S	1N4755A	1N4728	DZ						43	6.0	5.0	1.0W
1N4178	S	1N4756	1N4728	DZ						47	5.5	20	1.0W
1N4178A	S	1N4756	1N4728	DZ						47	5.5	10	1.0W
1N4178B	S	1N4756A	1N4728	DZ						47	5.5	5.0	1.0W
1N4179	S	1N4757	1N4728	DZ						51	5.0	20	1.0W
1N4179A	S	1N4757	1N4728	DZ						51	5.0	10	1.0W
1N4179B	S	1N4757A	1N4728	DZ						51	5.0	5.0	1.0W
1N4180	S	1N4758	1N4728	DZ						56	4.5	20	1.0W
1N4180A	S	1N4758	1N4728	DZ						56	4.5	10	1.0W
1N4180B	S	1N4758A	1N4728	DZ						56	4.5	5.0	1.0W
1N4181	S	1N4759	1N4728	DZ						62	4.0	20	1.0W
1N4181A	S	1N4759	1N4728	DZ						62	4.0	10	1.0W
1N4181B	S	1N4759A	1N4728	DZ						62	4.0	5.0	1.0W
1N4182	S	1N4760	1N4728	DZ						68	3.7	20	1.0W
1N4182A	S	1N4760	1N4728	DZ						68	3.7	10	1.0W
1N4182B	S	1N4760A	1N4728	DZ						68	3.7	5.0	1.0W
1N4183	S	1N4761	1N4728	DZ						75	3.3	20	1.0W
1N4183A	S	1N4761	1N4728	DZ						75	3.3	10	1.0W
1N4183B	S	1N4761A	1N4728	DZ						75	3.3	5.0	1.0W
1N4184	S	1N4762	1N4728	DZ						82	3.0	20	1.0W
1N4184A	S	1N4762	1N4728	DZ						82	3.0	10	1.0W
1N4184B	S	1N4762A	1N4728	DZ						82	3.0	5.0	1.0W
1N4185	S	1N4763	1N4728	DZ						91	2.8	20	1.0W
1N4185A	S	1N4763	1N4728	DZ						91	2.8	10	1.0W
1N4185B	S	1N4763A	1N4728	DZ						91	2.8	5.0	1.0W



**1N4186-1N4213**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> %	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts)	I <sub>F</sub> @	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N4186	S	1N4764	1N4728	DZ						100	2.5	20	1.0W
1N4186A	S	1N4764	1N4728	DZ						100	2.5	10	1.0W
1N4186B	S	1N4764A	1N4728	DZ						100	2.5	5.0	1.0W
1N4187	S	1M110ZS10 †	1N4728	DZ						110	2.3	20	1.0W
1N4187A	S	1M110ZS10 †	1N4728	DZ						110	2.3	10	1.0W
1N4187B	S	1M110ZS5 †	1N4728	DZ						110	2.3	5.0	1.0W
1N4188	S	1M120ZS10 †	1N4728	DZ						120	2.0	20	1.0W
1N4188A	S	1M120ZS10 †	1N4728	DZ						120	2.0	10	1.0W
1N4188B	S	1M120ZS5 †	1N4728	DZ						120	2.0	5.0	1.0W
1N4189	S	1M130ZS10 †	1N4728	DZ						130	1.9	20	1.0W
1N4189A	S	1M130ZS10 †	1N4728	DZ						130	1.9	10	1.0W
1N4189B	S	1M130ZS5 †	1N4728	DZ						130	1.9	5.0	1.0W
1N4190	S	1M150ZS10 †	1N4728	DZ						150	1.7	20	1.0W
1N4190A	S	1M150ZS10 †	1N4728	DZ						150	1.7	10	1.0W
1N4190B	S	1M150ZS5 †	1N4728	DZ						150	1.7	5.0	1.0W
1N4191	S	1M160ZS10 †	1N4728	DZ						160	1.6	20	1.0W
1N4191A	S	1M160ZS10 †	1N4728	DZ						160	1.6	10	1.0W
1N4191B	S	1M160ZS5 †	1N4728	DZ						160	1.6	5.0	1.0W
1N4192	S	1M180ZS10 †	1N4728	DZ						180	1.4	20	1.0W
1N4192A	S	1M180ZS10 †	1N4728	DZ						180	1.4	10	1.0W
1N4192B	S	1M180ZS5 †	1N4728	DZ						180	1.4	5.0	1.0W
1N4193	S	1M200ZS10 †	1N4728	DZ						200	1.2	20	1.0W
1N4193A	S	1M200ZS10 †	1N4728	DZ						200	1.2	10	1.0W
1N4193B	S	1M200ZS5 †	1N4728	DZ						200	1.2	5.0	1.0W
1N4194	S	1N2970	1N2970	DZ						6.8	370	20	10W
1N4194A	S	1N2970A	1N2970	DZ						6.8	370	10	10W
1N4194B	S	1N2970B	1N2970	DZ						6.8	370	5.0	10W
1N4195	S	1N2971	1N2970	DZ						7.5	335	20	10W
1N4195A	S	1N2971A	1N2970	DZ						7.5	335	10	10W
1N4195B	S	1N2971B	1N2970	DZ						7.5	335	5.0	10W
1N4196	S	1N2972	1N2970	DZ						8.2	305	20	10W
1N4196A	S	1N2972A	1N2970	DZ						8.2	305	10	10W
1N4196B	S	1N2972B	1N2970	DZ						8.2	305	5.0	10W
1N4197	S	1N2973	1N2970	DZ						9.1	275	20	10W
1N4197A	S	1N2973A	1N2970	DZ						9.1	275	10	10W
1N4197B	S	1N2973B	1N2970	DZ						9.1	275	5.0	10W
1N4198	S	1N2974	1N2970	DZ						10	250	20	10W
1N4198A	S	1N2974A	1N2970	DZ						10	250	10	10W
1N4198B	S	1N2974B	1N2970	DZ						10	250	5.0	10W
1N4199	S	1N2975	1N2970	DZ						11	230	20	10W
1N4199A	S	1N2975A	1N2970	DZ						11	230	10	10W
1N4199B	S	1N2975B	1N2970	DZ						11	230	5.0	10W
1N4200	S	1N2976	1N2970	DZ						12	210	20	10W
1N4200A	S	1N2976A	1N2970	DZ						12	210	10	10W
1N4200B	S	1N2976B	1N2970	DZ						12	210	5.0	10W
1N4201	S	1N2977	1N2970	DZ						13	190	20	10W
1N4201A	S	1N2977A	1N2970	DZ						13	190	10	10W
1N4201B	S	1N2977B	1N2970	DZ						13	190	5.0	10W
1N4202	S	1N2978	1N2970	DZ						14	180	20	10W
1N4202A	S	1N2978A	1N2970	DZ						14	180	10	10W
1N4202B	S	1N2978B	1N2970	DZ						14	180	5.0	10W
1N4203	S	1N2979	1N2970	DZ						15	170	20	10W
1N4203A	S	1N2979A	1N2970	DZ						15	170	10	10W
1N4203B	S	1N2979B	1N2970	DZ						15	170	5.0	10W
1N4204	S	1N2980	1N2970	DZ						16	155	20	10W
1N4204A	S	1N2980A	1N2970	DZ						16	155	10	10W
1N4204B	S	1N2980B	1N2970	DZ						16	155	5.0	10W
1N4205	S	1N2981	1N2970	DZ						17	145	20	10W
1N4205A	S	1N2981A	1N2970	DZ						17	145	10	10W
1N4205B	S	1N2981B	1N2970	DZ						17	145	5.0	10W
1N4206	S	1N2982	1N2970	DZ						18	140	20	10W
1N4206A	S	1N2982A	1N2970	DZ						18	140	10	10W
1N4206B	S	1N2982B	1N2970	DZ						18	140	5.0	10W
1N4207	S	1N2983	1N2970	DZ						19	130	20	10W
1N4207A	S	1N2983A	1N2970	DZ						19	130	10	10W
1N4207B	S	1N2983B	1N2970	DZ						19	130	5.0	10W
1N4208	S	1N2984	1N2970	DZ						20	125	20	10W
1N4208A	S	1N2984A	1N2970	DZ						20	125	10	10W
1N4208B	S	1N2984B	1N2970	DZ						20	125	5.0	10W
1N4209	S	1N2985	1N2970	DZ						22	115	20	10W
1N4209A	S	1N2985A	1N2970	DZ						22	115	10	10W
1N4209B	S	1N2985B	1N2970	DZ						22	115	5.0	10W
1N4210	S	1N2986	1N2970	DZ						24	105	20	10W
1N4210A	S	1N2986A	1N2970	DZ						24	105	10	10W
1N4210B	S	1N2986B	1N2970	DZ						24	105	5.0	10W
1N4211	S	1N2987	1N2970	DZ						25	100	20	10W
1N4211A	S	1N2987A	1N2970	DZ						25	100	10	10W
1N4211B	S	1N2987B	1N2970	DZ						25	100	5.0	10W
1N4212	S	1N2988	1N2970	DZ						27	95	20	10W
1N4212A	S	1N2988A	1N2970	DZ						27	95	10	10W
1N4212B	S	1N2988B	1N2970	DZ						27	95	5.0	10W
1N4213	S	1N2989	1N2970	DZ						30	85	20	10W

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4213A	S	1N2989A	1N2970	DZ						30	85	10	10W
1N4213B	S	1N2989B	1N2970	DZ						30	85	5.0	10W
1N4214	S	1N2990	1N2970	DZ						33	75	20	10W
1N4214A	S	1N2990A	1N2970	DZ						33	75	10	10W
1N4214B	S	1N2990B	1N2970	DZ						33	75	5.0	10W
1N4215	S	1N2991	1N2970	DZ						36	70	20	10W
1N4215A	S	1N2991A	1N2970	DZ						36	70	10	10W
1N4215B	S	1N2991B	1N2970	DZ						36	70	5.0	10W
1N4216	S	1N2992	1N2970	DZ						39	65	20	10W
1N4216A	S	1N2992A	1N2970	DZ						39	65	10	10W
1N4216B	S	1N2992B	1N2970	DZ						39	65	5.0	10W
1N4217	S	1N2993	1N2970	DZ						43	60	20	10W
1N4217A	S	1N2993A	1N2970	DZ						43	60	10	10W
1N4217B	S	1N2993B	1N2970	DZ						43	60	5.0	10W
1N4218	S	1N2994	1N2970	DZ						45	55	20	10W
1N4218A	S	1N2994A	1N2970	DZ						45	55	10	10W
1N4218B	S	1N2994B	1N2970	DZ						45	55	5.0	10W
1N4219	S	1N2995	1N2970	DZ						47	55	20	10W
1N4219A	S	1N2995A	1N2970	DZ						47	55	10	10W
1N4219B	S	1N2995B	1N2970	DZ						47	55	5.0	10W
1N4220	S	1N2996	1N2970	DZ						50	50	20	10W
1N4220A	S	1N2996A	1N2970	DZ						50	50	10	10W
1N4220B	S	1N2996B	1N2970	DZ						50	50	5.0	10W
1N4221	S	1N2997	1N2970	DZ						51	50	20	10W
1N4221A	S	1N2997A	1N2970	DZ						51	50	10	10W
1N4221B	S	1N2997B	1N2970	DZ						51	50	5.0	10W
1N4222	S	1N2998	1N2970	DZ						52	50	20	10W
1N4222A	S	1N2998A	1N2970	DZ						52	50	10	10W
1N4222B	S	1N2998B	1N2970	DZ						52	50	5.0	10W
1N4223	S	1N2999	1N2970	DZ						56	45	20	10W
1N4223A	S	1N2999A	1N2970	DZ						56	45	10	10W
1N4223B	S	1N2999B	1N2970	DZ						56	45	5.0	10W
1N4224	S	1N3000	1N2970	DZ						62	40	20	10W
1N4224A	S	1N3000A	1N2970	DZ						62	40	10	10W
1N4224B	S	1N3000B	1N2970	DZ						62	40	5.0	10W
1N4225	S	1N3001	1N2970	DZ						68	37	20	10W
1N4225A	S	1N3001A	1N2970	DZ						68	37	10	10W
1N4225B	S	1N3001B	1N2970	DZ						68	37	5.0	10W
1N4226	S	1N3002	1N2970	DZ						75	33	20	10W
1N4226A	S	1N3002A	1N2970	DZ						75	33	10	10W
1N4226B	S	1N3002B	1N2970	DZ						75	33	5.0	10W
1N4227	S	1N3003	1N2970	DZ						82	30	20	10W
1N4227A	S	1N3003A	1N2970	DZ						82	30	10	10W
1N4227B	S	1N3003B	1N2970	DZ						82	30	5.0	10W
1N4228	S	1N3004	1N2970	DZ						91	28	20	10W
1N4228A	S	1N3004A	1N2970	DZ						91	28	10	10W
1N4228B	S	1N3004B	1N2970	DZ						91	28	5.0	10W
1N4229	S	1N3005	1N2970	DZ						100	25	20	10W
1N4229A	S	1N3005A	1N2970	DZ						100	25	10	10W
1N4229B	S	1N3005B	1N2970	DZ						100	25	5.0	10W
1N4230	S	1N3006	1N2970	DZ						105	25	20	10W
1N4230A	S	1N3006A	1N2970	DZ						105	25	10	10W
1N4230B	S	1N3006B	1N2970	DZ						105	25	5.0	10W
1N4231	S	1N3007	1N2970	DZ						110	23	20	10W
1N4231A	S	1N3007A	1N2970	DZ						110	23	10	10W
1N4231B	S	1N3007B	1N2970	DZ						110	23	5.0	10W
1N4232	S	1N3008	1N2970	DZ						120	20	20	10W
1N4232A	S	1N3008A	1N2970	DZ						120	20	10	10W
1N4232B	S	1N3008B	1N2970	DZ						120	20	5.0	10W
1N4233	S	1N3009	1N2970	DZ						130	19	20	10W
1N4233A	S	1N3009A	1N2970	DZ						130	19	10	10W
1N4233B	S	1N3009B	1N2970	DZ						130	19	5.0	10W
1N4234	S	1N3010	1N2970	DZ						140	18	20	10W
1N4234A	S	1N3010A	1N2970	DZ						140	18	10	10W
1N4234B	S	1N3010B	1N2970	DZ						140	18	5.0	10W
1N4235	S	1N3011	1N2970	DZ						150	17	20	10W
1N4235A	S	1N3011A	1N2970	DZ						150	17	10	10W
1N4235B	S	1N3011B	1N2970	DZ						150	17	5.0	10W
1N4236	S	1N3012	1N2970	DZ						160	16	20	10W
1N4236A	S	1N3012A	1N2970	DZ						160	16	10	10W
1N4236B	S	1N3012B	1N2970	DZ						160	16	5.0	10W
1N4237	S	1N3013	1N2970	DZ						175	14	20	10W
1N4237A	S	1N3013A	1N2970	DZ						175	14	10	10W
1N4237B	S	1N3013B	1N2970	DZ						175	14	5.0	10W
1N4238	S	1N3014	1N2970	DZ						180	14	20	10W
1N4238A	S	1N3014A	1N2970	DZ						180	14	10	10W
1N4238B	S	1N3014B	1N2970	DZ						180	14	5.0	10W
1N4239	S	1N3015	1N2970	DZ						200	12	20	10W
1N4239A	S	1N3015A	1N2970	DZ						200	12	10	10W
1N4239B	S	1N3015B	1N2970	DZ						200	12	5.0	10W
1N4240	S	10M5.0A2Z †		DZ						400	5.0	2.0	10W
1N4241	S	10M6.0A2Z †		DZ						350	6.0	2.0	10W

†See page 1-1a for ordering information.



## 1N4242-1N4279B

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4242	S			DS	40	1.0	20M	0.1N	2.0				
1N4243	S			DS	40	1.0	10M	0.1N	2.0				
1N4244	S			DS	10	1.0	20M	0.1*	0.75				
1N4245	S	1N4003	1N4001	R	200	1.64	1.0	0.05	25				
1N4246	S	1N4004	1N4001	R	400	1.64	1.0	0.05	25				
1N4247	S	1N4005	1N4001	R	600	1.64	1.0	0.05	25				
1N4248	S	1N4006	1N4001	R	800	1.64	1.0	0.05	25				
1N4249	S	1N4007	1N4001	R	1000	1.64	1.0	0.05	25				
1N4250	S	1N4006	1N4001	R	800		0.5	0.05	10				
1N4251	S	1N4007	1N4001	R	1000		0.5	0.05	10				
1N4252	S			R	1200		0.5	0.05	10				
1N4253	S			R	1500		0.5	0.05	10				
1N4254	S	MR991A	MR990A	R	1500	4.8	0.25	0.05	6.25				
1N4255	S	MR992A	MR990A	R	2000	4.8	0.25	0.05	6.25				
1N4256	S	MR993A	MR990A	R	2500	4.8	0.25	0.05	6.25				
1N4257	S	MR994A	MR990A	R	3000	4.8	0.25	0.05	6.25				
1N4258	S	1N2970	1N2970	DZ						6.8	370	20	10W
1N4258A	S	1N2970A	1N2970	DZ						6.8	370	10	10W
1N4258B	S	1N2970B	1N2970	DZ						6.8	370	5.0	10W
1N4259	S	1N2971	1N2970	DZ						7.5	335	20	10W
1N4259A	S	1N2971A	1N2970	DZ						7.5	335	10	10W
1N4259B	S	1N2971B	1N2970	DZ						7.5	335	5.0	10W
1N4260	S	1N2972	1N2970	DZ						8.2	305	20	10W
1N4260A	S	1N2972A	1N2970	DZ						8.2	305	10	10W
1N4260B	S	1N2972B	1N2970	DZ						8.2	305	5.0	10W
1N4261	S	1N2973	1N2970	DZ						9.1	275	20	10W
1N4261A	S	1N2973A	1N2970	DZ						9.1	275	10	10W
1N4261B	S	1N2973B	1N2970	DZ						9.1	275	5.0	10W
1N4262	S	1N2974	1N2970	DZ						10	250	20	10W
1N4262A	S	1N2974A	1N2970	DZ						10	250	10	10W
1N4262B	S	1N2974B	1N2970	DZ						10	250	5.0	10W
1N4263	S	1N2975	1N2970	DZ						11	230	20	10W
1N4263A	S	1N2975A	1N2970	DZ						11	230	10	10W
1N4263B	S	1N2975B	1N2970	DZ						11	230	5.0	10W
1N4264	S	1N2976	1N2970	DZ						12	210	20	10W
1N4264A	S	1N2976A	1N2970	DZ						12	210	10	10W
1N4264B	S	1N2976B	1N2970	DZ						12	210	5.0	10W
1N4265	S	1N2977	1N2970	DZ						13	190	20	10W
1N4265A	S	1N2977A	1N2970	DZ						13	190	10	10W
1N4265B	S	1N2977B	1N2970	DZ						13	190	5.0	10W
1N4266	S	1N2979	1N2970	DZ						15	170	20	10W
1N4266A	S	1N2979A	1N2970	DZ						15	170	10	10W
1N4266B	S	1N2979B	1N2970	DZ						15	170	5.0	10W
1N4267	S	1N2980	1N2970	DZ						16	155	20	10W
1N4267A	S	1N2980A	1N2970	DZ						16	155	10	10W
1N4267B	S	1N2980B	1N2970	DZ						16	155	5.0	10W
1N4268	S	1N2982	1N2970	DZ						18	140	20	10W
1N4268A	S	1N2982A	1N2970	DZ						18	140	10	10W
1N4268B	S	1N2982B	1N2970	DZ						18	140	5.0	10W
1N4269	S	1N2984	1N2970	DZ						20	125	20	10W
1N4269A	S	1N2984A	1N2970	DZ						20	125	10	10W
1N4269B	S	1N2984B	1N2970	DZ						20	125	5.0	10W
1N4270	S	1N2985	1N2979	DZ						22	115	20	10W
1N4270A	S	1N2985A	1N2970	DZ						22	115	10	10W
1N4270B	S	1N2985B	1N2970	DZ						22	115	5.0	10W
1N4271	S	1N2986	1N2970	DZ						24	105	20	10W
1N4271A	S	1N2986A	1N2970	DZ						24	105	10	10W
1N4271B	S	1N2986B	1N2970	DZ						24	105	5.0	10W
1N4272	S	1N2988	1N2970	DZ						27	95	20	10W
1N4272A	S	1N2988A	1N2970	DZ						27	95	10	10W
1N4272B	S	1N2988B	1N2970	DZ						27	95	5.0	10W
1N4273	S	1N2989	1N2970	DZ						30	85	20	10W
1N4273A	S	1N2989A	1N2970	DZ						30	85	10	10W
1N4273B	S	1N2989B	1N2970	DZ						30	85	5.0	10W
1N4274	S	1N2990	1N2970	DZ						33	75	20	10W
1N4274A	S	1N2990A	1N2970	DZ						33	75	10	10W
1N4274B	S	1N2990B	1N2970	DZ						33	75	5.0	10W
1N4275	S	1N2991	1N2970	DZ						36	70	20	10W
1N4275A	S	1N2991A	1N2970	DZ						36	70	10	10W
1N4275B	S	1N2991B	1N2970	DZ						36	70	5.0	10W
1N4276	S	1N2992	1N2970	DZ						39	65	20	10W
1N4276A	S	1N2992A	1N2970	DZ						39	65	10	10W
1N4276B	S	1N2992B	1N2970	DZ						39	65	5.0	10W
1N4277	S	1N2993	1N2970	DZ						43	60	20	10W
1N4277A	S	1N2993A	1N2970	DZ						43	60	10	10W
1N4277B	S	1N2993B	1N2970	DZ						43	60	5.0	10W
1N4278	S	1N2995	1N2970	DZ						47	55	20	10W
1N4278A	S	1N2995A	1N2970	DZ						47	55	10	10W
1N4278B	S	1N2995B	1N2970	DZ						47	55	5.0	10W
1N4279	S	1N2997	1N2970	DZ						51	55	20	10W
1N4279A	S	1N2997A	1N2970	DZ						51	55	10	10W
1N4279B	S	1N2997B	1N2970	DZ						51	55	5.0	10W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4280	S	1N2999	1N2970	DZ						56	45	20	10W
1N4280A	S	1N2999A	1N2970	DZ						56	45	10	10W
1N4280B	S	1N2999B	1N2970	DZ						56	45	5.0	10W
1N4281	S	1N3000	1N2970	DZ						62	40	20	10W
1N4281A	S	1N3000A	1N2970	DZ						62	40	10	10W
1N4281B	S	1N3000B	1N2970	DZ						62	40	5.0	10W
1N4282	S	1N3001	1N2970	DZ						68	37	20	10W
1N4282A	S	1N3001A	1N2970	DZ						68	37	10	10W
1N4282B	S	1N3001B	1N2970	DZ						68	37	5.0	10W
1N4283	S	1N3002	1N2970	DZ						75	33	20	10W
1N4283A	S	1N3002A	1N2970	DZ						75	33	10	10W
1N4283B	S	1N3002B	1N2970	DZ						75	33	5.0	10W
1N4284	S	1N3003	1N2970	DZ						82	30	20	10W
1N4284A	S	1N3003A	1N2970	DZ						82	30	10	10W
1N4284B	S	1N3003B	1N2970	DZ						82	30	5.0	10W
1N4285	S	1N3004	1N2970	DZ						91	28	20	10W
1N4285A	S	1N3004A	1N2970	DZ						91	28	10	10W
1N4285B	S	1N3004B	1N2970	DZ						91	28	5.0	10W
1N4286	S	1N3005	1N2970	DZ						100	25	20	10W
1N4286A	S	1N3005A	1N2970	DZ						100	25	10	10W
1N4286B	S	1N3005B	1N2970	DZ						100	25	5.0	10W
1N4287	S	1N3007	1N2970	DZ						110	23	20	10W
1N4287A	S	1N3007A	1N2970	DZ						110	23	10	10W
1N4287B	S	1N3007B	1N2970	DZ						110	23	5.0	10W
1N4288	S	1N3008	1N2970	DZ						120	20	20	10W
1N4288A	S	1N3008A	1N2970	DZ						120	20	10	10W
1N4288B	S	1N3008B	1N2970	DZ						120	20	5.0	10W
1N4289	S	1N3009	1N2970	DZ						130	19	20	10W
1N4289A	S	1N3009A	1N2970	DZ						130	19	10	10W
1N4289B	S	1N3009B	1N2970	DZ						130	19	5.0	10W
1N4290	S	1N3011	1N2970	DZ						150	17	20	10W
1N4290A	S	1N3011A	1N2970	DZ						150	17	10	10W
1N4290B	S	1N3011B	1N2970	DZ						150	17	5.0	10W
1N4291	S	1N3012	1N2970	DZ						160	16	20	10W
1N4291A	S	1N3012A	1N2970	DZ						160	16	10	10W
1N4291B	S	1N3012B	1N2970	DZ						160	16	5.0	10W
1N4292	S	1N3014	1N2970	DZ						180	14	20	10W
1N4292A	S	1N3014A	1N2970	DZ						180	14	10	10W
1N4292B	S	1N3014B	1N2970	DZ						180	14	5.0	10W
1N4293	S	1N3015	1N2970	DZ						200	12	20	10W
1N4293A	S	1N3015A	1N2970	DZ						200	12	10	10W
1N4293B	S	1N3015B	1N2970	DZ						200	12	5.0	10W
1N4294	S	Microwave S-band Mixer											
1N4295	S			DR						10	0.012	10	-55/150
1N4295A	S			DR						10	0.012	10	-55/150
1N4296	S			DR						10	0.012	20	-55/150
1N4296A	S			DR						10	0.012	20	-55/150
1N4297	S			DR						8.8	0.01	200	0/75
1N4297A	S			DR						8.8	0.01	200	-55/100
1N4297B	S			DR						8.8	0.01	200	-55/150
1N4298	S			DR						8.8	0.005	200	0/75
1N4298A	S			DR						8.8	0.005	200	-55/100
1N4298B	S			DR						8.8	0.005	200	-55/150
1N4299	S			DR						11.3	0.01	150	0/75
1N4299A	S			DR						11.3	0.01	150	-55/100
1N4299B	S			DR						11.3	0.01	150	-55/150
1N4300	S			DR						11.3	0.01	150	0/75
1N4300A	S			DR						11.3	0.005	150	-55/100
1N4300B	S			DR						11.3	0.005	150	-55/150
1N4301	S			DR						8.8	0.005	1000	0/50
1N4301A	S			DR						8.8	0.01	1000	-55/50
1N4301B	S			DR						8.8	0.01	1000	-55/50
1N4302	S			DR						8.8	0.01	1000	0/50
1N4302A	S			DR						8.8	0.005	1000	-55/100
1N4302B	S			DR						8.8	0.005	1000	-55/150
1N4303	S			DR						11.3	0.005	1000	0/75
1N4303A	S			DR						11.3	0.01	750	-55/50
1N4303B	S			DR						11.3	0.01	750	-55/50
1N4304	S			DR						11.3	0.005	750	0/50
1N4304A	S			DR						11.3	0.005	750	-55/50
1N4304B	S			DR						11.3	0.005	750	-55/50
1N4305	S			DS	75	0.575	0.25M	0.1*	2.0	11.3	0.005	750	-55/50
1N4306	S			DS	50	1.0	50M	50N	2.0				
1N4307	S			DS	50	1.0	50M	50N	2.0				
1N4308	S			DS	80	1.0	200M	0.1*	2.0				
1N4309	S			DS	40	1.0	400M	0.1*	2.0				
1N4310	S			DS	60	1.0	400M	0.1*	2.0				
1N4311	S			DS	80	1.0	300M	0.1*	2.0				
1N4312	S			DS	120	1.0	200M	0.1*	2.0				
1N4313	S			DS	80	1.0	100M	0.1*	4.0				
1N4314	S			DS	80	1.0	200M	0.1*	2.0				
1N4315	S			DS	40	1.0	400M	0.1*	2.0				



**1N4316-1N4347B**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)		V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4316	S			DS	60	1.0	400M	0.1*	2.0				
1N4317	S			DS	80	1.0	300M	0.1*	2.0				
1N4318	S			DS	120	1.0	200M	0.1*	2.0				
1N4319	S			DS	80	1.0	100M	0.1*	4.0				
1N4320	S			DS	640			1.0*					
1N4321	S	5M50ZS10 †	1N4728	DS						50	15	10	3.0W
1N4322	S			DS	50	1.0	0.2A	0.1*	6.0				
1N4323	S	1N4736	1N4728	DZ						6.8	37	20	1.0W
1N4323A	S	1N4736	1N4728	DZ						6.8	37	10	1.0W
1N4323B	S	1N4736A	1N4728	DZ						6.8	37	5.0	1.0W
1N4324	S	1N4737	1N4728	DZ						7.5	34	20	1.0W
1N4324A	S	1N4737	1N4728	DZ						7.5	34	10	1.0W
1N4324B	S	1N4737A	1N4728	DZ						7.5	34	5.0	1.0W
1N4325	S	1N4738	1N4728	DZ						8.2	31	20	1.0W
1N4325A	S	1N4738	1N4728	DZ						8.2	31	10	1.0W
1N4325B	S	1N4738A	1N4728	DZ						8.2	31	5.0	1.0W
1N4326	S	1N4739	1N4728	DZ						9.1	28	20	1.0W
1N4326A	S	1N4739	1N4728	DZ						9.1	28	10	1.0W
1N4326B	S	1N4739A	1N4782	DZ						9.1	28	5.0	1.0W
1N4327	S	1N4740	1N4728	DZ						10	25	20	1.0W
1N4327A	S	1N4740	1N4728	DZ						10	25	10	1.0W
1N4327B	S	1N4740A	1N4728	DZ						10	25	5.0	1.0W
1N4328	S	1N4741	1N4728	DZ						11	23	20	1.0W
1N4328A	S	1N4741	1N4728	DZ						11	23	10	1.0W
1N4328B	S	1N4741A	1N4728	DZ						11	23	5.0	1.0W
1N4329	S	1N4742	1N4728	DZ						12	21	20	1.0W
1N4329A	S	1N4742	1N4728	DZ						12	21	10	1.0W
1N4329B	S	1N4742A	1N4728	DZ						12	21	5.0	1.0W
1N4330	S	1N4743	1N4728	DZ						13	19	20	1.0W
1N4330A	S	1N4743	1N4728	DZ						13	19	10	1.0W
1N4330B	S	1N4743A	1N4728	DZ						13	19	5.0	1.0W
1N4331	S	1N4744	1N4728	DZ						15	17	20	1.0W
1N4331A	S	1N4744	1N4728	DZ						15	17	10	1.0W
1N4331B	S	1N4744A	1N4728	DZ						15	17	5.0	1.0W
1N4332	S	1N4745	1N4728	DZ						16	16	20	1.0W
1N4332A	S	1N4745	1N4728	DZ						16	16	10	1.0W
1N4332B	S	1N4745A	1N4728	DZ						16	16	5.0	1.0W
1N4333	S	1N4746	1N4728	DZ						18	14	20	1.0W
1N4333A	S	1N4746	1N4728	DZ						18	14	10	1.0W
1N4333B	S	1N4746A	1N4728	DZ						18	14	5.0	1.0W
1N4334	S	1N4747	1N4728	DZ						20	13	20	1.0W
1N4334A	S	1N4747	1N4728	DZ						20	13	10	1.0W
1N4334B	S	1N4747A	1N4728	DZ						20	13	5.0	1.0W
1N4335	S	1N4748	1N4728	DZ						22	12	20	1.0W
1N4335A	S	1N4748	1N4728	DZ						22	12	10	1.0W
1N4335B	S	1N4748A	1N4728	DZ						22	12	5.0	1.0W
1N4336	S	1N4749	1N4728	DZ						24	11	20	1.0W
1N4336A	S	1N4749	1N4728	DZ						24	11	10	1.0W
1N4336B	S	1N4749A	1N4728	DZ						24	11	5.0	1.0W
1N4337	S	1N4750	1N4728	DZ						27	9.5	20	1.0W
1N4337A	S	1N4750	1N4728	DZ						27	9.5	10	1.0W
1N4337B	S	1N4750A	1N4728	DZ						27	9.5	5.0	1.0W
1N4338	S	1N4751	1N4728	DZ						30	8.5	20	1.0W
1N4338A	S	1N4751	1N4728	DZ						30	8.5	10	1.0W
1N4338B	S	1N4751A	1N4728	DZ						30	8.5	5.0	1.0W
1N4339	S	1N4752	1N4728	DZ						33	7.5	20	1.0W
1N4339A	S	1N4752	1N4728	DZ						33	7.5	10	1.0W
1N4339B	S	1N4752A	1N4728	DZ						33	7.5	5.0	1.0W
1N4340	S	1N4753	1N4728	DZ						36	7.0	20	1.0W
1N4340A	S	1N4753	1N4728	DZ						36	7.0	10	1.0W
1N4340B	S	1N4753A	1N4728	DZ						36	7.0	5.0	1.0W
1N4341	S	1N4754	1N4728	DZ						39	6.5	20	1.0W
1N4341A	S	1N4754	1N4728	DZ						39	6.5	10	1.0W
1N4341B	S	1N4754A	1N4728	DZ						39	6.5	5.0	1.0W
1N4342	S	1N4755	1N4728	DZ						43	6.0	20	1.0W
1N4342A	S	1N4755	1N4728	DZ						43	6.0	10	1.0W
1N4342B	S	1N4755A	1N4728	DZ						43	6.0	5.0	1.0W
1N4343	S	1N4756	1N4728	DZ						47	5.5	20	1.0W
1N4343A	S	1N4756	1N4728	DZ						47	5.5	10	1.0W
1N4343B	S	1N4756A	1N4728	DZ						47	5.5	5.0	1.0W
1N4344	S	1N4757	1N4728	DZ						51	5.0	20	1.0W
1N4344A	S	1N4757	1N4728	DZ						51	5.0	10	1.0W
1N4344B	S	1N4757A	1N4728	DZ						51	5.0	5.0	1.0W
1N4345	S	1N4758	1N4728	DZ						56	4.5	20	1.0W
1N4345A	S	1N4758	1N4728	DZ						56	4.5	10	1.0W
1N4345B	S	1N4758A	1N4728	DZ						56	4.5	5.0	1.0W
1N4346	S	1N4759	1N4728	DZ						62	4.0	20	1.0W
1N4346A	S	1N4759	1N4728	DZ						62	4.0	10	1.0W
1N4346B	S	1N4759A	1N4728	DZ						62	4.0	5.0	1.0W
1N4347	S	1N4760	1N4728	DZ						68	3.7	20	1.0W
1N4347A	S	1N4760	1N4728	DZ						68	3.7	10	1.0W
1N4347B	S	1N4760A	1N4728	DZ						68	3.7	5.0	1.0W

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4348	S	1N4761	1N4728	DZ						75	3.3	20	1.0W
1N4348A	S	1N4761	1N4728	DZ						75	3.3	10	1.0W
1N4348B	S	1N4761A	1N4728	DZ						75	3.3	5.0	1.0W
1N4349	S	1N4762	1N4728	DZ						82	3.0	20	1.0W
1N4349A	S	1N4762	1N4728	DZ						82	3.0	10	1.0W
1N4349B	S	1N4762A	1N4728	DZ						82	3.0	5.0	1.0W
1N4350	S	1N4763	1N4728	DZ						91	2.8	20	1.0W
1N4350A	S	1N4763	1N4728	DZ						91	2.8	10	1.0W
1N4350B	S	1N4763A	1N4728	DZ						91	2.8	5.0	1.0W
1N4351	S	1N4764	1N4728	DZ						100	2.5	20	1.0W
1N4351A	S	1N4764	1N4728	DZ						100	2.5	10	1.0W
1N4351B	S	1N4764A	1N4728	DZ						100	2.5	5.0	1.0W
1N4352	S	1M10ZS10 †	1N4728	DZ						110	2.3	20	1.0W
1N4352A	S	1M10ZS10 †	1N4728	DZ						110	2.3	10	1.0W
1N4352B	S	1M10ZS5 †	1N4728	DZ						110	2.3	5.0	1.0W
1N4353	S	1M120ZS10 †	1N4728	DZ						120	2.0	20	1.0W
1N4353A	S	1M120ZS10 †	1N4728	DZ						120	2.0	10	1.0W
1N4353B	S	1M120ZS5 †	1N4728	DZ						120	2.0	5.0	1.0W
1N4354	S	1M130ZS10 †	1N4728	DZ						130	1.9	20	1.0W
1N4354A	S	1M130ZS10 †	1N4728	DZ						130	1.9	10	1.0W
1N4354B	S	1M130ZS5 †	1N4728	DZ						130	1.9	5.0	1.0W
1N4355	S	1M150ZS10 †	1N4728	DZ						150	1.7	20	1.0W
1N4355A	S	1M150ZS10 †	1N4728	DZ						150	1.7	10	1.0W
1N4355B	S	1M150ZS5 †	1N4728	DZ						150	1.7	5.0	1.0W
1N4356	S	1M160ZS10 †	1N4728	DZ						160	1.6	20	1.0W
1N4356A	S	1M160ZS10 †	1N4728	DZ						160	1.6	10	1.0W
1N4356B	S	1M160ZS5 †	1N4728	DZ						160	1.6	5.0	1.0W
1N4357	S	1M180ZS10 †	1N4728	DZ						180	1.4	20	1.0W
1N4357A	S	1M180ZS10 †	1N4728	DZ						180	1.4	10	1.0W
1N4357B	S	1M180ZS5 †	1N4728	DZ						180	1.4	5.0	1.0W
1N4358	S	1M200ZS10 †	1N4728	DZ						200	1.2	20	1.0W
1N4358A	S	1M200ZS10 †	1N4728	DZ						200	1.2	10	1.0W
1N4358B	S	1M200ZS5 †	1N4728	DZ						200	1.2	5.0	1.0W
1N4359	S			DS	200								
1N4360	S	1N4370A*	1N746	DZ						2.4	10	5.0	0.25W
1N4361	S	1N4007	1N4001	DZ	900	1.3	0.5	0.5	20				
1N4362	S			DS	100	0.9	0.1A	10N					
1N4363	S			DS	120	1.0	0.2A	0.1*	40				
1N4364	S	1N4002	1N4001	R	100	1.5	0.75	0.1	20				
1N4365	S	1N4003	1N4001	R	200	1.5	0.75	0.1	20				
1N4366	S	1N4004	1N4001	R	300	1.5	0.75	0.1	20				
1N4367	S	1N4004	1N4001	R	400	1.5	0.75	0.1	20				
1N4368	S	1N4005	1N4001	R	500	1.5	0.75	0.1	20				
1N4369	S	1N4005	1N4001	R	600	1.5	0.75	0.1	20				
1N4370	S			DZ						2.4	20	10	0.4W
1N4370A	S			DZ						2.4	20	5.0	0.4W
1N4371	S			DZ						2.7	20	10	0.4W
1N4371A	S			DZ						2.7	20	5.0	0.4W
1N4372	S			DZ						3.0	20	10	0.4W
1N4372A	S			DZ						3.0	20	5.0	0.4W
1N4373	S	MR991A	MR990A	DS	80	1.0	10M	5.0*	4.0				
1N4374	S			R	1500	1.75	0.75	0.1	15				
1N4375	S			DS	50	1.0	20M	10N	6.0				
1N4376	S			DS	10	1.1	50M	0.1*	0.75				
1N4377	S			R	25K	30	0.75	0.1	50				
1N4378	S	Photosensitive Device; I <sub>(dark)</sub> = 10 nA, Sensitivity = 9.0 mA @ V <sub>CE</sub> = 5.0 V, H = 9.0 mW/cm <sup>2</sup>											
1N4379	S	Microwave S-band Detector											
1N4380	S			DS	50	1.4	570M	50N	1.8				
1N4381	G			DS	25	0.35	2.0M	0.1M	0.1				
1N4382	S			DS	55	1.0	0.3A	0.1*	6.5				
1N4383	S	1N4003	1N4001	R	200	1.3	1.0	0.275	50				
1N4384	S	1N4004	1N4001	R	400	1.3	1.0	0.25	50				
1N4385	S	1N4005	1N4001	R	600	1.3	1.0	0.225	50				
1N4387 } 1N4388 }	Varactor Diodes, see Table on Page 1-100												
1N4389	S			DS	5.0	1.0	2.0M	0.1M					
1N4390	S			DS	20	1.0	5.0M	0.2*	0.5				
1N4391	S			DS	20	1.0	2.0M	0.2*	0.5				
1N4392	S			DS	15	1.0	2.0M	1.0*	0.5				
1N4393, A,B thru 1N4399, A,B	S	Tunnel Diodes											
1N4400	S	1N4736	1N4728	DZ						6.8	37	20	1.0W
1N4401	S	1N4737	1N4728	DZ						7.5	34	20	1.0W
1N4402	S	1N4738	1N4728	DZ						8.2	31	20	1.0W
1N4403	S	1N4739	1N4728	DZ						9.1	28	20	1.0W
1N4404	S	1N4740	1N4728	DZ						10	25	20	1.0W
1N4405	S	1N4741	1N4728	DZ						11	23	20	1.0W

Replacement \* denotes exact device type replacement available on request.

†See page 1-1a for ordering information.



**1N4406-1N4487**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4406	S	1N4742	1N4728	DZ						12	21	20	1.0W
1N4407	S	1N4743	1N4728	DZ						13	19	20	1.0W
1N4408	S	1N4744	1N4728	DZ						15	17	20	1.0W
1N4409	S	1N4745	1N4728	DZ						16	19	20	1.0W
1N4410	S	1N4746	1N4728	DZ						18	14	20	1.0W
1N4411	S	1N4747	1N4728	DZ						20	13	20	1.0W
1N4412	S	1N4748	1N4728	DZ						22	12	20	1.0W
1N4413	S	1N4749	1N4728	DZ						24	11	20	1.0W
1N4414	S	1N4750	1N4728	DZ						27	9.5	20	1.0W
1N4415	S	1N4751	1N4728	DZ						30	8.5	20	1.0W
1N4416	S	1N4752	1N4728	DZ						33	7.5	20	1.0W
1N4417	S	1N4753	1N4728	DZ						36	7.0	20	1.0W
1N4418	S	1N4754	1N4728	DZ						39	6.5	20	1.0W
1N4419	S	1N4755	1N4728	DZ						43	6.0	20	1.0W
1N4420	S	1N4756	1N4728	DZ						47	5.5	20	1.0W
1N4421	S	1N4757	1N4728	DZ						51	5.0	20	1.0W
1N4422	S	1N4758	1N4728	DZ						56	4.5	20	1.0W
1N4423	S	1N4759	1N4728	DZ						62	4.0	20	1.0W
1N4424	S	1N4760	1N4728	DZ						68	3.7	20	1.0W
1N4425	S	1N4761	1N4728	DZ						75	3.3	20	1.0W
1N4426	S	1N4762	1N4728	DZ						82	3.0	20	1.0W
1N4427	S	1N4763	1N4728	DZ						91	2.8	20	1.0W
1N4428	S	1N4764	1N4728	DZ						100	2.5	20	1.0W
1N4429	S	1M1102S10	1N4728	DZ						110	2.3	20	1.0W
1N4430	S	1M1202S10 †	1N4728	DZ						120	2.0	20	1.0W
1N4431	S	1M1302S10 †	1N4728	DZ						130	1.9	20	1.0W
1N4432	S	1M1502S10 †	1N4728	DZ						150	1.7	20	1.0W
1N4433	S	1M1602S10 †	1N4728	DZ						160	1.6	20	1.0W
1N4434	S	1M1802S10 †	1N4728	DZ						180	1.4	20	1.0W
1N4435	S	1M2002S10 †	1N4728	DZ						200	1.2	20	1.0W
1N4436	S			R	200	1.2	10	1.0	100				
1N4437	S			R	400	1.2	10	1.0	100				
1N4438	S			R	600	1.0	10	1.0	100				
1N4439	S			R	800	1.2	10	1.0	100				
1N4440	S			R	1000	1.2	10	1.0	100				
1N4441	S			R	1500	4.0	0.025	0.001	3.0				
1N4442	S			DS	30	1.0	0.1A	1.0N	1.0				
1N4443	S			DS	50	1.0	0.1A	2.0N	0.6				
1N4444	S			DS	50	1.0	0.1A	50N	7.0				
1N4445	S			DS	100	1.0	0.1A	50N	4.0				
1N4446	S			DS	75	1.0	20M	25N	4.0				
1N4447	S			DS	75	1.0	20M	25N	4.0				
1N4448	S			DS	75	0.72	5.0M	25N	4.0				
1N4449	S			DS	75	0.73	5.0M	25N	4.0				
1N4450	S			DS	30	0.92	0.1A	50N	4.0				
1N4451	S			DS	30	0.875	0.1A	50N	10				
1N4452	S			DS	30	1.2	1.0A	50N	50				
1N4453	S			DS	20	0.92	0.1A	50N					
1N4454	S			DS	75	1.0	10M	0.1*	2.0				
1N4455	S			DS	50	0.7	5.0M	0.1*					
1N4456	S			DS	35	1.0	0.15A	0.2*	1.5				
1N4457	S			DS	50	1.0	0.2A	0.2*	1.5				
1N4458	S			R	800	1.5	5.0	0.5	150				
1N4459	S			R	1000	1.5	5.0	0.5	150				
1N4460	S	1N4735A	1N4728	DZ						6.2	40	5.0	1.5W
1N4461	S	1N4736A	1N4728	DZ						6.8	37	5.0	1.5W
1N4462	S	1N4737A	1N4728	DZ						7.5	34	5.0	1.5W
1N4463	S	1N4738A	1N4728	DZ						8.2	31	5.0	1.5W
1N4464	S	1N4739A	1N4728	DZ						9.1	28	5.0	1.5W
1N4465	S	1N4740A	1N4728	DZ						10	25	5.0	1.5W
1N4466	S	1N4741A	1N4728	DZ						11	23	5.0	1.5W
1N4467	S	1N4742A	1N4728	DZ						12	21	5.0	1.5W
1N4468	S	1N4743A	1N4728	DZ						13	19	5.0	1.5W
1N4469	S	1N4744A	1N4728	DZ						15	17	5.0	1.5W
1N4470	S	1N4745A	1N4728	DZ						16	16	5.0	1.5W
1N4471	S	1N4746A	1N4728	DZ						18	14	5.0	1.5W
1N4472	S	1N4747A	1N4728	DZ						20	13	5.0	1.5W
1N4473	S	1N4748A	1N4728	DZ						22	12	5.0	1.5W
1N4474	S	1N4749A	1N4728	DZ						24	11	5.0	1.5W
1N4475	S	1N4750A	1N4728	DZ						27	9.5	5.0	1.5W
1N4476	S	1N4751A	1N4728	DZ						30	8.5	5.0	1.5W
1N4477	S	1N4752A	1N4728	DZ						33	7.5	5.0	1.5W
1N4478	S	1N4753A	1N4728	DZ						36	7.0	5.0	1.5W
1N4479	S	1N4754A	1N4728	DZ						39	6.5	5.0	1.5W
1N4480	S	1N4755A	1N4728	DZ						43	6.0	5.0	1.5W
1N4481	S	1N4756A	1N4728	DZ						47	5.5	5.0	1.5W
1N4482	S	1N4757A	1N4728	DZ						51	5.0	5.0	1.5W
1N4483	S	1N4758A	1N4728	DZ						56	4.5	5.0	1.5W
1N4484	S	1N4759A	1N4728	DZ						62	4.0	5.0	1.5W
1N4485	S	1N4760A	1N4728	DZ						68	3.7	5.0	1.5W
1N4486	S	1N4761A	1N4728	DZ						75	3.3	5.0	1.5W
1N4487	S	1N4762A	1N4728	DZ						82	3.0	5.0	1.5W

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4488	S	1N4763A	1N4728	DZ						91	2.8	5.0	1.5W
1N4489	S	1N4764A	1N4728	DZ						100	2.5	5.0	1.5W
1N4490	S	1M110ZS5	1N4728	DZ						110	2.3	5.0	1.5W
1N4491	S	1M120ZS5	1N4728	DZ						120	2.0	5.0	1.5W
1N4492	S	1M130ZS5	1N4728	DZ						130	1.9	5.0	1.5W
1N4493	S	1M150ZS5	1N4728	DZ						150	1.7	5.0	1.5W
1N4494	S	1M160ZS5	1N4728	DZ						160	1.6	5.0	1.5W
1N4495	S	1M180ZS5	1N4728	DZ						180	1.4	5.0	1.5W
1N4496	S	1M200ZS5	1N4728	DZ						200	1.2	5.0	1.5W
1N4497	S			R	1600	3.0	0.75	0.1	35				
1N4498	S			R	3000	5.0	0.75	0.1	35				
1N4499	S	1N4735A	1N4728	DZ						6.2		5.0	1.0W
1N4500	S			DS	80	1.0	0.3A	0.1*	4.0				
1N4501	S			DR						7.4	0.01		-55/100
1N4502	G			DS	20	0.3	3.0M	10*					
1N4503	S	1N4752	1N4728	DZ						33	20	10	3.0W
1N4504	S	1N5388A	1N5333	DZ						200	4.0	10	3.0W
1N4505	S			R	6000	8.5	0.1	0.1	20				
1N4506	S			R	200	1.4	12	2.5	240				
1N4507	S			R	400	1.4	12	2.5	240				
1N4508	S			R	600	1.4	12	2.5	240				
1N4509	S			R	800	1.4	12	2.0	240				
1N4510	S			R	1000	1.4	12	1.75	240				
1N4511	S			R	1200	1.4	12	1.5	240				
1N4512	S			DS	10	0.777	5.0M	10N					
1N4513	S			R	2000	4.5	0.25	0.1	20				
1N4514	S			R	800	1.0	1.1	0.1	50				
1N4517	S			R	200	1.2	2.0	0.1	100				
1N4523	G			DS	15	1.0	0.1A	30*	8.0				
1N4524	G			DS	10	0.65	10M	12*	3.0				
1N4525	S			R	200	1.4	35	3.5	500				
1N4526	S			R	400	1.4	35	3.5	500				
1N4527	S			R	600	1.4	35	3.5	500				
1N4528	S			R	800	1.4	35	3.0	500				
1N4529	S			R	1000	1.4	35	2.5	500				
1N4530	S			R	1200	1.4	35	2.0	500				
1N4531	S			DS	75	1.0	10M	25N	4.0				
1N4532	S			DS	75	1.0	10M	0.1*	2.0				
1N4533	S			DS	40	0.88	20M	50N	2.0				
1N4534	S			DS	50	0.88	20M	50N	2.0				
1N4535	S	.5M3.4ZZS5		DZ						3.45	5.0	5.0	0.5W
1N4536	S			DS	25	1.0	30M	0.1*	2.0				
1N4537	S			R	1500	1.85	3.0	0.3	15				
1N4538	S			R	2000	1.85	3.0	0.3	15				
1N4539	S			R	2500	1.85	3.0	0.3	15				
1N4540	S			R	3000	1.85	3.0	0.3	15				
1N4541	S			DS	225	1.0	0.4A	20N					
1N4542	S			DS	400	1.0	0.4A	20N					
1N4543	S			DS	600	1.0	0.4A	20N					
1N4544	S			DS	800	1.0	0.4A	20N					
1N4545	S			DS	1000	1.0	400M	0.02*					
1N4546	S			R	25K	30	1.0	0.1	50				
1N4547	S			DS	25	1.0	25M	10N					
1N4548	S			DS	25	1.0	30M	0.1*	4.0				
1N4549	S		1N2804	DZ						3.9	3.2	20	50W
1N4549A	S		1N2804	DZ						3.9	3.2	10	50W
1N4549B	S		1N2804	DZ						3.9	3.2	5.0	50W
1N4550	S		1N2804	DZ						4.3	2900	20	50W
1N4550A	S		1N2804	DZ						4.3	2900	10	50W
1N4550B	S		1N2804	DZ						4.3	2900	5.0	50W
1N4551	S		1N2804	DZ						4.7	2600	20	50W
1N4551A	S		1N2804	DZ						4.7	2600	10	50W
1N4551B	S		1N2804	DZ						4.7	2600	5.0	50W
1N4552	S		1N2804	DZ						5.1	2400	20	50W
1N4552A	S		1N2804	DZ						5.1	2400	10	50W
1N4552B	S		1N2804	DZ						5.1	2400	5.0	50W
1N4553	S		1N2804	DZ						5.6	2200	20	50W
1N4553A	S		1N2804	DZ						5.6	2200	10	50W
1N4553B	S		1N2804	DZ						5.6	2200	5.0	50W
1N4554	S		1N2804	DZ						6.2	2000	20	50W
1N4554A	S		1N2804	DZ						6.2	2000	10	50W
1N4554B	S		1N2804	DZ						6.2	2000	5.0	50W
1N4555	S		1N2804	DZ						6.8	1800	20	50W
1N4555A	S		1N2804	DZ						6.8	1800	10	50W
1N4555B	S		1N2804	DZ						6.8	1800	5.0	50W
1N4556	S		1N2804	DZ						7.5	1600	20	50W
1N4556A	S		1N2804	DZ						7.5	1600	10	50W
1N4556B	S		1N2804	DZ						7.5	1600	5.0	50W
1N4557	S		1N2804	DZ						3.9	3200	20	50W
1N4557A	S		1N2804	DZ						3.9	3200	10	50W
1N4557B	S		1N2804	DZ						3.9	3200	5.0	50W
1N4558	S		1N2804	DZ						4.3	2900	20	50W

\*See page 1-1a for ordering information.



**1N4558A-1N4605**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (min)	V <sub>Z</sub> (nom) * V <sub>Z</sub> (max)	Tol V <sub>Z</sub> %	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> (volts) @ I <sub>F</sub>		I <sub>R</sub>	t <sub>r</sub> (μs)	TC %/°C	V <sub>Z</sub>	T (min) °C	T (max) °C
1N4558A	S		1N2804	DZ						4.3	2900	10	50W
1N4558B	S		1N2804	DZ						4.3	2900	5.0	50W
1N4559	S		1N2804	DZ						4.7	2800	20	50W
1N4559A	S		1N2804	DZ						4.7	2800	10	50W
1N4559B	S		1N2804	DZ						4.7	2800	5.0	50W
1N4560	S		1N2804	DZ						5.1	2400	20	50W
1N4560A	S		1N2804	DZ						5.1	2400	10	50W
1N4560B	S		1N2804	DZ						5.1	2400	5.0	50W
1N4561	S		1N2804	DZ						5.6	2200	20	50W
1N4561A	S		1N2804	DZ						5.6	2200	10	50W
1N4561B	S		1N2804	DZ						5.6	2200	5.0	50W
1N4562	S		1N2804	DZ						6.2	2000	20	50W
1N4562A	S		1N2804	DZ						6.2	2000	10	50W
1N4562B	S		1N2804	DZ						6.2	2000	5.0	50W
1N4563	S		1N2804	DZ						6.8	1800	20	50W
1N4563A	S		1N2804	DZ						6.8	1800	10	50W
1N4563B	S		1N2804	DZ						6.8	1800	5.0	50W
1N4564	S		1N2804	DZ						7.5	1600	20	50W
1N4564A	S		1N2804	DZ						7.5	1600	10	50W
1N4564B	S		1N2804	DZ						7.5	1600	5.0	50W
1N4565	S		1N4549	DR						6.4	0.01	0.5	0/75
1N4565A	S		1N4549	DR						6.4	0.01	0.5	-55/100
1N4566	S		1N4549	DR						6.4	0.005	0.5	0/75
1N4566A	S		1N4549	DR						6.4	0.005	0.5	-55/100
1N4567	S		1N4549	DR						6.4	0.002	0.5	0/75
1N4567A	S		1N4549	DR						6.4	0.002	0.5	-55/100
1N4568	S		1N4549	DR						6.4	0.001	0.5	0/76
1N4568A	S		1N4549	DR						6.4	0.001	0.5	-55/100
1N4569	S		1N4549	DR						6.4	0.0005	0.5	0/75
1N4569A	S		1N4549	DR						6.4	0.0005	0.5	-55/100
1N4570	S		1N4549	DR						6.4	0.01	1.0	0/75
1N4570A	S		1N4549	DR						6.4	0.01	1.0	-55/100
1N4571	S		1N4549	DR						6.4	0.005	1.0	0/75
1N4571A	S		1N4549	DR						6.4	0.005	1.0	-55/100
1N4572	S		1N4549	DR						6.4	0.002	1.0	0/75
1N4572A	S		1N4549	DR						6.4	0.002	1.0	-55/100
1N4573	S		1N4549	DR						6.4	0.001	1.0	0/75
1N4573A	S		1N4549	DR						6.4	0.001	1.0	-55/100
1N4574	S		1N4549	DR						6.4	0.0005	1.0	0/75
1N4574A	S		1N4549	DR						6.4	0.0005	1.0	-55/100
1N4575	S			DR						6.4	0.01	2.0	0/75
1N4575A	S			DR						6.4	0.01	2.0	-55/100
1N4576	S			DR						6.4	0.005	2.0	0/75
1N4576A	S			DR						6.4	0.005	2.0	-55/100
1N4577	S			DR						6.4	0.002	2.0	0/75
1N4577A	S			DR						6.4	0.002	2.0	-55/100
1N4578	S			DR						6.4	0.001	2.0	0/75
1N4578A	S			DR						6.4	0.001	2.0	-55/100
1N4579	S			DR						6.4	0.0005	2.0	0/75
1N4579A	S			DR						6.4	0.0005	2.0	-55/100
1N4580	S			DR						6.4	0.01	4.0	0/75
1N4580A	S			DR						6.4	0.01	4.0	-55/100
1N4581	S			DR						6.4	0.005	4.0	0/75
1N4581A	S			DR						6.4	0.005	4.0	-55/100
1N4582	S			DR						6.4	0.002	4.0	0/75
1N4582A	S			DR						6.4	0.002	4.0	-55/100
1N4583	S			DR						6.4	0.0001	4.0	0/75
1N4583A	S			DR						6.4	0.0001	4.0	-55/100
1N4584	S			DR						6.4	0.0005	4.0	0/75
1N4584A	S			DR						6.4	0.0005	4.0	-55/100
1N4585	S			R	800	1.3	1.0	0.2	50				
1N4586	S			R	1000	1.3	1.0	0.2	50				
1N4587	S	MR1221SB	MR1220	R	100	1.35	150	9.5	3000				
1N4588	S	MR1223SB	MR1220	R	200	1.35	150	9.5	3000				
1N4589	S	MR1225SB	MR1220	R	300	1.35	150	9.0	3000				
1N4590	S	MR1227SB	MR1220	R	400	1.35	150	9.0	3000				
1N4591	S	MR1228SB	MR1220	R	500	1.35	150	8.0	3000				
1N4592	S	MR1229SB	MR1220	R	600	1.35	150	6.5	3000				
1N4593	S			R	800	1.35	150	5.5	3000				
1N4594	S			R	1000	1.35	150	4.5	3000				
1N4595	S			R	1200	1.35	150	4.0	3000				
1N4596	S			R	1400	1.35	150	3.5	3000				
1N4597	S			R	5000	5.0	0.025		1.0				
1N4598		Varactor Diodes, see Table on Page 1-100											
1N4599													
1N4600	S	Microwave Mixer:	f = 13,300 MHz, NF = 9.5 dB										
1N4601	S	Microwave Mixer:	f = 13,300 MHz, NF = 8.8 dB										
1N4602	S	Microwave Mixer:	f = 13,300 MHz, NF = 8.0 dB										
1N4603	S	Microwave Mixer:	f = 16,000 MHz, NF = 9.5 dB										
1N4604	S	Microwave Mixer:	f = 16,000 MHz, NF = 8.8 dB										
1N4605	S	Microwave Mixer:	f = 16,000 MHz, NF = 8.0 dB										



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4606	S	Varactor Diode, see Table on Page 1-100	DS	DS	70	1.0	0.2A	0.25*	6.0				
1N4607	S		DS	DS	70	0.95	250M	0.25*	10				
1N4608	S		DS	DS	70	0.96	350M	0.25*	10				
1N4609	S												
1N4610	S												
1N4611	S	1N4576A *	1N4549	DR	55	1.1	0.3A	0.1*	2.0	6.6	0.005	2.0	-50/175
1N4611A	S	1N4577A *	1N4549	DR						6.6	0.002	2.0	-50/175
1N4611B	S	1N4578A *	1N4549	DR						6.6	0.001	2.0	-50/175
1N4611C	S	1N4579A *	1N4549	DR						6.6	0.0005	2.0	-50/175
1N4612	S	1N4581A *	1N4549	DR						6.6	0.005	5.0	-50/175
1N4612A	S	1N4582A *	1N4549	DR						6.6	0.002	5.0	-50/175
1N4612B	S	1N4583A *	1N4549	DR						6.6	0.001	5.0	-50/175
1N4612C	S	1N4584A *	1N4549	DR						6.6	0.0005	5.0	-50/175
1N4613	S	1N4581A *	1N4549	DR						6.6	0.005	10	-50/175
1N4613A	S	1N4582A *	1N4549	DR						6.6	0.002	10	-50/175
1N4613B	S	1N4583A *	1N4549	DR						6.6	0.001	10	-50/175
1N4613C	S	1N4584A *	1N4549	DR						6.6	0.0005	10	-50/175
1N4614	S	MZ4614	1N4099	DZ						1.8	0.25	5.0	0.25W
1N4615	S	MZ4615	1N4099	DZ						2.0	0.25	5.0	0.25W
1N4616	S	MZ4616	1N4099	DZ						2.2	0.25	5.0	0.25W
1N4617	S	MZ4617	1N4099	DZ						2.4	0.25	5.0	0.25W
1N4618	S	MZ4618	1N4099	DZ						2.7	0.25	5.0	0.25W
1N4619	S	MZ4619	1N4099	DZ						3.0	0.25	5.0	0.25W
1N4620	S	MZ4620	1N4099	DZ						3.3	0.25	5.0	0.25W
1N4621	S	MZ4621	1N4099	DZ						3.6	0.25	5.0	0.25W
1N4622	S	MZ4622	1N4099	DZ						3.9	0.25	5.0	0.25W
1N4623	S	MZ4623	1N4099	DZ						4.3	0.25	5.0	0.25W
1N4624	S	MZ4624	1N4099	DZ						4.7	0.25	5.0	0.25W
1N4625	S	MZ4625	1N4099	DZ						5.1	0.25	5.0	0.25W
1N4626	S	MZ4626	1N4099	DZ						5.6	0.25	5.0	0.25W
1N4627	S	MZ4627	1N4099	DZ						6.2	0.25	5.0	0.25W
1N4628	S	1N4736A	1N4728	DZ						6.8	19	5.0	0.6W
1N4629	S	1N4737A	1N4728	DZ						7.5	17	5.0	0.6W
1N4630	S	1N4738A	1N4728	DZ						8.2	15	5.0	0.6W
1N4631	S	1N4739A	1N4728	DZ						9.1	14	5.0	0.6W
1N4632	S	1N4740A	1N4728	DZ						10	13	5.0	0.6W
1N4633	S	1N4741A	1N4728	DZ						11	12	5.0	0.6W
1N4634	S	1N4742A	1N4728	DZ						12	11	5.0	0.6W
1N4635	S	1N4743A	1N4728	DZ						13	9.5	5.0	0.6W
1N4636	S	1N4744A	1N4728	DZ						15	8.5	5.0	0.6W
1N4637	S	1N4745A	1N4728	DZ						16	7.8	5.0	0.6W
1N4638	S	1N4746A	1N4728	DZ						18	7.0	5.0	0.6W
1N4639	S	1N4747A	1N4728	DZ						20	6.2	5.0	0.6W
1N4640	S	1N4748A	1N4728	DZ						22	6.0	5.0	0.6W
1N4641	S	1N4749A	1N4728	DZ						24	5.2	5.0	0.6W
1N4642	S	1N4750A	1N4728	DZ						27	4.6	5.0	0.6W
1N4643	S	1N4751A	1N4728	DZ						30	4.2	5.0	0.6W
1N4644	S	1N4752A	1N4728	DZ						33	3.8	5.0	0.6W
1N4645	S	1N4753A	1N4728	DZ						36	3.4	5.0	0.6W
1N4646	S	1N4754A	1N4728	DZ						39	3.2	5.0	0.6W
1N4647	S	1N4755A	1N4728	DZ						43	3.0	5.0	0.6W
1N4648	S	1N4756A	1N4728	DZ						47	2.7	5.0	0.6W
1N4649	S	1N4728A	1N4728	DZ						3.3	10	5.0	1.0W
1N4650	S	1N4729A	1N4728	DZ						3.6	10	5.0	1.0W
1N4651	S	1N4730A	1N4728	DZ						3.9	64	5.0	1.0W
1N4652	S	1N4731A	1N4728	DZ						4.3	58	5.0	1.0W
1N4653	S	1N4732A	1N4728	DZ						4.7	53	5.0	1.0W
1N4654	S	1N4733A	1N4728	DZ						5.1	49	5.0	1.0W
1N4655	S	1N4734A	1N4728	DZ						5.6	45	5.0	1.0W
1N4656	S	1N4735A	1N4728	DZ						6.2	41	5.0	1.0W
1N4657	S	1N4736A	1N4728	DZ						6.8	37	5.0	1.0W
1N4658	S	1N4737A	1N4728	DZ						7.5	34	5.0	1.0W
1N4659	S	1N4738A	1N4728	DZ						8.2	31	5.0	1.0W
1N4660	S	1N4739A	1N4728	DZ						9.1	28	5.0	1.0W
1N4661	S	1N4740A	1N4728	DZ						10	25	5.0	1.0W
1N4662	S	1N4741A	1N4728	DZ						11	23	5.0	1.0W
1N4663	S	1N4742A	1N4728	DZ						12	21	5.0	1.0W
1N4664	S	1N4743A	1N4728	DZ						13	19	5.0	1.0W
1N4665	S	1N4744A	1N4728	DZ						15	17	5.0	1.0W
1N4666	S	1N4745A	1N4728	DZ						16	16	5.0	1.0W
1N4667	S	1N4746A	1N4728	DZ						18	14	5.0	1.0W
1N4668	S	1N4747A	1N4728	DZ						20	13	5.0	1.0W
1N4669	S	1N4748A	1N4728	DZ						22	12	5.0	1.0W
1N4670	S	1N4749A	1N4728	DZ						24	11	5.0	1.0W
1N4671	S	1N4750A	1N4728	DZ						27	9.5	5.0	1.0W
1N4672	S	1N4751A	1N4728	DZ						30	8.5	5.0	1.0W
1N4673	S	1N4752A	1N4728	DZ						33	7.5	5.0	1.0W
1N4674	S	1N4753A	1N4728	DZ						36	7.0	5.0	1.0W
1N4675	S	1N4754A	1N4728	DZ						39	6.5	5.0	1.0W
1N4676	S	1N4755A	1N4728	DZ						43	6.0	5.0	1.0W
1N4677	S	1N4756A	1N4728	DZ						47	5.5	5.0	1.0W

Replacement \* denotes exact device type replacement available on request.



**1N4678-1N4733**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4678	S	MZ4678		DZ						1.8	105	5.0	250
1N4679	S	MZ4679		DZ						2.0	105	5.0	250
1N4680	S	MZ4680		DZ						2.2	105	5.0	250
1N4681	S	MZ4681		DZ						2.4	105	5.0	250
1N4682	S	MZ4682		DZ						2.7	105	5.0	250
1N4683	S	MZ4683		DZ						3.0	105	5.0	250
1N4684	S	MZ4684		DZ						3.3	105	5.0	250
1N4685	S	MZ4685		DZ						3.6	105	5.0	250
1N4686	S	MZ4686		DZ						3.9	105	5.0	250
1N4687	S	MZ4687		DZ						4.3	105	5.0	250
1N4688	S	MZ4688		DZ						4.7	105	5.0	250
1N4689	S	MZ4689		DZ						5.1	105	5.0	250
1N4690	S	MZ4690		DZ						5.6	105	5.0	250
1N4691	S	MZ4691		DZ						6.2	105	5.0	250
1N4692	S	MZ4692		DZ						6.8	105	5.0	250
1N4693	S	MZ4693		DZ						7.5	105	5.0	250
1N4694	S	MZ4694		DZ						8.2	105	5.0	250
1N4695	S	MZ4695		DZ						8.7	105	5.0	250
1N4696	S	MZ4696		DZ						9.1	105	5.0	250
1N4697	S	MZ4697		DZ						10	105	5.0	250
1N4698	S	MZ4698		DZ						11	105	5.0	250
1N4699	S	MZ4699		DZ						12	105	5.0	250
1N4700	S	MZ4700		DZ						13	105	5.0	250
1N4701	S	MZ4701		DZ						14	105	5.0	250
1N4702	S	MZ4702		DZ						15	105	5.0	250
1N4703	S	MZ4703		DZ						16	105	5.0	250
1N4704	S	MZ4704		DZ						17	105	5.0	250
1N4705	S	MZ4705		DZ						18	105	5.0	250
1N4706	S	MZ4706		DZ						19	105	5.0	250
1N4707	S	MZ4707		DZ						20	105	5.0	250
1N4708	S	MZ4708		DZ						22	105	5.0	250
1N4709	S	MZ4709		DZ						24	105	5.0	250
1N4710	S	MZ4710		DZ						25	105	5.0	250
1N4711	S	MZ4711		DZ						27	105	5.0	250
1N4712	S	MZ4712		DZ						28	105	5.0	250
1N4713	S	MZ4713		DZ						30	105	5.0	250
1N4714	S	MZ4714		DZ						33	105	5.0	250
1N4715	S	MZ4715		DZ						36	105	5.0	250
1N4716	S	MZ4716		DZ						39	105	5.0	250
1N4717	S	MZ4717		DZ						40	105	5.0	250
1N4718	S			DS	50	1.2	0.75A	50*	180				
1N4719	S			R	50	1.0	3.0	1.5	300				
1N4720	S			R	100	1.0	3.0	1.5	300				
1N4721	S			R	200	1.0	3.0	1.5	300				
1N4722	S			R	400	1.0	3.0	1.5	300				
1N4723	S			R	600	1.0	3.0	1.5	300				
1N4724	S			R	800	1.0	3.0	1.5	300				
1N4725	S			R	1000	1.0	3.0	1.5	300				
1N4726	S			DS	20	0.85	10M	0.1*					
1N4727	S			DS	20	0.85	10M	0.1*					
1N4728	S		1N4728	DZ						3.3	76	10	1.0W
1N4728A	S		1N4728	DZ						3.3	76	5.0	1.0W
1N4729	S		1N4728	DZ						3.6	69	10	1.0W
1N4729A	S		1N4728	DZ						3.6	69	5.0	1.0W
1N4730	S		1N4728	DZ						3.9	64	10	1.0W
1N4730A	S		1N4728	DZ						3.9	64	5.0	1.0W
1N4731	S		1N4728	DZ						4.3	58	10	1.0W
1N4731A	S		1N4728	DZ						4.3	58	5.0	1.0W
1N4732	S		1N4728	DZ						4.7	53	10	1.0W
1N4732A	S		1N4728	DZ						4.7	53	5.0	1.0W
1N4733	S		1N4728	DZ						5.1	49	10	1.0W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub> (mA)	I <sub>R</sub> (mA)	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4733A	S		1N4728	DZ						5.1	49	5.0	1.0W
1N4734	S		1N4728	DZ						5.6	45	10	1.0W
1N4734A	S		1N4728	DZ						5.6	45	5.0	1.0W
1N4735	S		1N4728	DZ						6.2	41	10	1.0W
1N4735A	S		1N4728	DZ						6.2	41	5.0	1.0W
1N4736	S		1N4728	DZ						6.8	37	10	1.0W
1N4736A	S		1N4728	DZ						6.8	37	5.0	1.0W
1N4737	S		1N4728	DZ						7.5	34	10	1.0W
1N4737A	S		1N4728	DZ						7.5	34	5.0	1.0W
1N4738	S		1N4728	DZ						8.2	31	10	1.0W
1N4738A	S		1N4728	DZ						8.2	31	5.0	1.0W
1N4739	S		1N4728	DZ						9.1	28	10	1.0W
1N4739A	S		1N4728	DZ						9.1	28	5.0	1.0W
1N4740	S		1N4728	DZ						10	25	10	1.0W
1N4740A	S		1N4728	DZ						10	25	5.0	1.0W
1N4741	S		1N4728	DZ						11	23	10	1.0W
1N4741A	S		1N4728	DZ						11	23	5.0	1.0W
1N4742	S		1N4728	DZ						12	21	10	1.0W
1N4742A	S		1N4728	DZ						12	21	5.0	1.0W
1N4743	S		1N4728	DZ						13	19	10	1.0W
1N4743A	S		1N4728	DZ						13	19	5.0	1.0W
1N4744	S		1N4728	DZ						15	17	10	1.0W
1N4744A	S		1N4728	DZ						15	17	5.0	1.0W
1N4745	S		1N4728	DZ						16	15.5	10	1.0W
1N4745A	S		1N4728	DZ						16	15.5	5.0	1.0W
1N4746	S		1N4728	DZ						18	14	10	1.0W
1N4746A	S		1N4728	DZ						18	14	5.0	1.0W
1N4747	S		1N4728	DZ						20	12.5	10	1.0W
1N4747A	S		1N4728	DZ						20	12.5	5.0	1.0W
1N4748	S		1N4728	DZ						22	11.5	10	1.0W
1N4748A	S		1N4728	DZ						22	11.5	5.0	1.0W
1N4749	S		1N4728	DZ						24	10.5	10	1.0W
1N4749A	S		1N4728	DZ						24	10.5	5.0	1.0W
1N4750	S		1N4728	DZ						27	9.5	10	1.0W
1N4750A	S		1N4728	DZ						27	9.5	5.0	1.0W
1N4751	S		1N4728	DZ						30	8.5	10	1.0W
1N4751A	S		1N4728	DZ						30	8.5	5.0	1.0W
1N4752	S		1N4728	DZ						33	7.5	10	1.0W
1N4752A	S		1N4728	DZ						33	7.5	5.0	1.0W
1N4753	S		1N4728	DZ						36	7.0	10	1.0W
1N4753A	S		1N4728	DZ						36	7.0	5.0	1.0W
1N4754	S		1N4728	DZ						39	6.5	10	1.0W
1N4754A	S		1N4728	DZ						39	6.5	5.0	1.0W
1N4755	S		1N4728	DZ						43	6.0	10	1.0W
1N4755A	S		1N4728	DZ						43	6.0	5.0	1.0W
1N4756	S		1N4728	DZ						47	5.5	10	1.0W
1N4756A	S		1N4728	DZ						47	5.5	5.0	1.0W
1N4757	S		1N4728	DZ						51	5.0	10	1.0W
1N4757A	S		1N4728	DZ						51	5.0	5.0	1.0W
1N4758	S		1N4728	DZ						56	4.5	10	1.0W
1N4758A	S		1N4728	DZ						56	4.5	5.0	1.0W
1N4759	S		1N4728	DZ						62	4.0	10	1.0W
1N4759A	S		1N4728	DZ						62	4.0	5.0	1.0W
1N4760	S		1N4728	DZ						68	3.7	10	1.0W
1N4760A	S		1N4728	DZ						68	3.7	5.0	1.0W
1N4761	S		1N4728	DZ						75	3.3	10	1.0W
1N4761A	S		1N4728	DZ						75	3.3	5.0	1.0W
1N4762	S		1N4728	DZ						82	3.0	10	1.0W
1N4762A	S		1N4728	DZ						82	3.0	5.0	1.0W
1N4763	S		1N4728	DZ						91	2.8	10	1.0W
1N4763A	S		1N4728	DZ						91	2.8	5.0	1.0W
1N4764	S		1N4728	DZ						100	2.5	10	1.0W



**1N4764A-1N4838**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °/°C	I <sub>ZT</sub> mA	Temp Range
1N4764A	S		1N4728	DZ						100	2.4	5.0	1.0W
1N4765	S		1N4549	DR						9.1	0.01	0.5	0/75
1N4765A	S		1N4549	DR						9.1	0.01	0.5	-55/100
1N4766	S		1N4549	DR						9.1	0.005	0.5	0/75
1N4766A	S		1N4549	DR						9.1	0.005	0.5	-55/100
1N4767	S		1N4549	DR						9.1	0.002	0.5	0/75
1N4767A	S		1N4549	DR						9.1	0.002	0.5	-55/100
1N4768	S		1N4549	DR						9.1	0.001	0.5	0/75
1N4768A	S		1N4549	DR						9.1	0.001	0.5	-55/100
1N4769	S		1N4549	DR						9.1	0.0005	0.5	0/75
1N4769A	S		1N4549	DR						9.1	0.0005	0.5	-55/100
1N4770	S		1N4549	DR						9.1	0.01	1.0	0/75
1N4770A	S		1N4549	DR						9.1	0.01	1.0	-55/100
1N4771	S		1N4549	DR						9.1	0.005	1.0	0/75
1N4771A	S		1N4549	DR						9.1	0.005	1.0	-55/100
1N4772	S		1N4549	DR						9.1	0.002	1.0	0/75
1N4772A	S		1N4549	DR						9.1	0.002	1.0	-55/100
1N4773	S		1N4549	DR						9.1	0.001	1.0	0/75
1N4773A	S		1N4549	DR						9.1	0.001	1.0	-55/100
1N4774	S		1N4549	DR						9.1	0.0005	1.0	0/75
1N4774A	S		1N4549	DR						9.1	0.0005	1.0	-55/100
1N4775	S		1N4549	DR						8.5	0.01	0.5	0/75
1N4775A	S		1N4549	DR						8.5	0.01	0.5	-55/100
1N4776	S		1N4549	DR						8.5	0.005	0.5	0/75
1N4776A	S		1N4549	DR						8.5	0.005	0.5	-55/100
1N4777	S		1N4549	DR						8.5	0.002	0.5	0/75
1N4777A	S		1N4549	DR						8.5	0.002	0.5	-55/100
1N4778	S		1N4549	DR						8.5	0.001	0.5	0/75
1N4778A	S		1N4549	DR						8.5	0.001	0.5	-55/100
1N4779	S		1N4549	DR						8.5	0.0005	0.5	0/75
1N4779A	S		1N4549	DR						8.5	0.0005	0.5	-55/100
1N4780	S		1N4549	DR						8.5	0.01	1.0	0/75
1N4780A	S		1N4549	DR						8.5	0.01	1.0	-55/100
1N4781	S		1N4549	DR						8.5	0.005	1.0	0/75
1N4781A	S		1N4549	DR						8.5	0.005	1.0	-55/100
1N4782	S		1N4549	DR						8.5	0.002	1.0	0/75
1N4782A	S		1N4549	DR						8.5	0.002	1.0	-55/100
1N4783	S		1N4549	DR						8.5	0.001	1.0	0/75
1N4783A	S		1N4549	DR						8.5	0.001	1.0	-55/100
1N4784	S		1N4549	DR						8.5	0.0005	1.0	0/75
1N4784A	S		1N4549	DR						8.5	0.0005	1.0	-55/100
1N4786 thru 1N4815		Varactor Diodes, see Table on Page 1-100											
1N4816	S	1N4001	1N4001	R	50	1.3	1.5	0.25	50				
1N4817	S	1N4002	1N4001	R	100	1.3	1.5	0.25	50				
1N4818	S	1N4003	1N4001	R	200	1.3	1.5	0.25	50				
1N4819	S	1N4004	1N4001	R	300	1.3	1.5	0.25	50				
1N4820	S	1N4004	1N4001	R	400	1.3	1.5	0.25	50				
1N4821	S	1N4005	1N4001	R	500	1.3	1.5	0.25	50				
1N4822	S	1N4005	1N4001	R	600	1.3	1.5	0.25	50				
1N4823	S			R	100	1.25	1.0	1.0	35				
1N4824	S			R	200	1.25	1.0	1.0	35				
1N4825	S			R	400	1.25	1.0	1.0	35				
1N4826	S			R	600	1.25	1.0	1.0	35				
1N4827	G			DS	30	1.0	40M	15*	0.2				
1N4828	S			DS	20	1.1	0.1A	0.1*					
1N4829	S			DS	20	1.87	0.1A	0.1*					
1N4830	S			DS	20	2.69	0.1A	0.1*					
1N4831	S	1N4739	1N4728	DZ						9.1	28	20	1.2W
1N4831A	S	1N4739	1N4728	DZ						9.1	28	10	1.2W
1N4831B	S	1N4739A	1N4728	DZ						9.1	28	5.0	1.2W
1N4832	S	1N4740	1N4728	DZ						10	25	20	1.2W
1N4832A	S	1N4740	1N4728	DZ						10	25	10	1.2W
1N4832B	S	1N4740A	1N4728	DZ						10	25	5.0	1.2W
1N4833	S	1N4741	1N4728	DZ						11	23	20	1.2W
1N4833A	S	1N4741	1N4728	DZ						11	23	10	1.2W
1N4833B	S	1N4741A	1N4728	DZ						11	23	5.0	1.2W
1N4834	S	1N4742	1N4728	DZ						12	21	20	1.2W
1N4834A	S	1N4742	1N4728	DZ						12	21	10	1.2W
1N4834B	S	1N4742A	1N4728	DZ						12	21	5.0	1.2W
1N4835	S	1N4743	1N4728	DZ						13	19	20	1.2W
1N4835A	S	1N4743	1N4728	DZ						13	19	10	1.2W
1N4835B	S	1N4743A	1N4728	DZ						13	19	5.0	1.2W
1N4836	S	1N4744	1N4728	DZ						15	17	20	1.2W
1N4836A	S	1N4744	1N4728	DZ						15	17	10	1.2W
1N4836B	S	1N4744A	1N4728	DZ						15	17	5.0	1.2W
1N4837	S	1N4745	1N4728	DZ						16	16	20	1.2W
1N4837A	S	1N4745	1N4728	DZ						16	16	10	1.2W
1N4837B	S	1N4745A	1N4728	DZ						16	16	5.0	1.2W
1N4838	S	1N4746	1N4728	DZ						18	14	20	1.2W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4838A	S	1N4746	1N4728	DZ						18	14	10	1.2W
1N4838B	S	1N4746A	1N4728	DZ						18	14	5.0	1.2W
1N4839	S	1N4747	1N4728	DZ						20	19	20	1.2W
1N4839A	S	1N4747	1N4728	DZ						20	19	10	1.2W
1N4839B	S	1N4747A	1N4728	DZ						20	19	5.0	1.2W
1N4840	S	1N4748	1N4728	DZ						22	11	20	1.2W
1N4840A	S	1N4748	1N4728	DZ						22	11	10	1.2W
1N4840B	S	1N4748A	1N4728	DZ						22	11	5.0	1.2W
1N4841	S	1N4749	1N4728	DZ						24	11	20	1.2W
1N4841A	S	1N4749	1N4728	DZ						24	11	10	1.2W
1N4841B	S	1N4749A	1N4728	DZ						24	11	5.0	1.2W
1N4842	S	1N4750	1N4728	DZ						27	9.3	20	1.2W
1N4842A	S	1N4750	1N4728	DZ						27	9.3	10	1.2W
1N4842B	S	1N4750A	1N4728	DZ						27	9.3	5.0	1.2W
1N4843	S	1N4751	1N4728	DZ						30	8.3	20	1.2W
1N4843A	S	1N4751	1N4728	DZ						30	8.3	10	1.2W
1N4843B	S	1N4751A	1N4728	DZ						30	8.3	5.0	1.2W
1N4844	S	1N4752	1N4728	DZ						33	7.5	20	1.2W
1N4844A	S	1N4752	1N4728	DZ						33	7.5	10	1.2W
1N4844B	S	1N4752A	1N4728	DZ						33	7.5	5.0	1.2W
1N4845	S	1N4753	1N4728	DZ						36	7.0	20	1.2W
1N4845A	S	1N4753	1N4728	DZ						36	7.0	10	1.2W
1N4845B	S	1N4753A	1N4728	DZ						36	7.0	5.0	1.2W
1N4846	S	1N4754	1N4728	DZ						39	6.5	20	1.2W
1N4846A	S	1N4754	1N4728	DZ						39	6.5	10	1.2W
1N4846B	S	1N4754A	1N4728	DZ						39	6.5	5.0	1.2W
1N4847	S	1N4755	1N4728	DZ						43	5.8	20	1.2W
1N4847A	S	1N4755	1N4728	DZ						43	5.8	10	1.2W
1N4847B	S	1N4755A	1N4728	DZ						43	5.8	5.0	1.2W
1N4848	S	1N4756	1N4728	DZ						47	5.3	20	1.2W
1N4848A	S	1N4756	1N4728	DZ						47	5.3	10	1.2W
1N4848B	S	1N4756A	1N4728	DZ						47	5.3	5.0	1.2W
1N4849	S	1N4757	1N4728	DZ						51	5.0	20	1.2W
1N4849A	S	1N4757	1N4728	DZ						51	5.0	10	1.2W
1N4849B	S	1N4757A	1N4728	DZ						51	5.0	5.0	1.2W
1N4850	S	1N4758	1N4728	DZ						56	4.5	20	1.2W
1N4850A	S	1N4758	1N4728	DZ						56	4.5	10	1.2W
1N4850B	S	1N4758A	1N4728	DZ						56	4.5	5.0	1.2W
1N4851	S	1N4759	1N4728	DZ						62	4.0	20	1.2W
1N4851A	S	1N4759	1N4728	DZ						62	4.0	10	1.2W
1N4851B	S	1N4759A	1N4728	DZ						62	4.0	5.0	1.2W
1N4852	S	1N4760	1N4728	DZ						68	3.7	20	1.2W
1N4852A	S	1N4760	1N4728	DZ						68	3.7	10	1.2W
1N4852B	S	1N4760A	1N4728	DZ						68	3.7	5.0	1.2W
1N4853	S	1N4761	1N4728	DZ						75	3.3	20	1.2W
1N4853A	S	1N4761	1N4728	DZ						75	3.3	10	1.2W
1N4853B	S	1N4761A	1N4728	DZ						75	3.3	5.0	1.2W
1N4854	S	1N4762	1N4728	DZ						82	3.0	20	1.2W
1N4854A	S	1N4762	1N4728	DZ						82	3.0	10	1.2W
1N4854B	S	1N4762A	1N4728	DZ						82	3.0	5.0	1.2W
1N4855	S	1N4763	1N4728	DZ						91	2.8	20	1.2W
1N4855A	S	1N4763	1N4728	DZ						91	2.8	10	1.2W
1N4855B	S	1N5763A	1N4728	DZ						91	2.8	5.0	1.2W
1N4856	S	1N5764	1N4728	DZ						100	2.5	20	1.2W
1N4856A	S	1N5764	1N4728	DZ						100	2.5	10	1.2W
1N4856B	S	1N5764A	1N4728	DZ						100	2.5	5.0	1.2W
1N4857	S	1M110ZS10 †	1N4728	DZ						110	2.3	20	1.2W
1N4857A	S	1M110ZS10 †	1N4728	DZ						110	2.3	10	1.2W
1N4857B	S	1M110ZS5 †	1N4728	DZ						110	2.3	5.0	1.2W
1N4858	S	1M120ZS10 †	1N4728	DZ						120	1.2	20	1.2W
1N4858A	S	1M120ZS10 †	1N4728	DZ						120	1.2	10	1.2W
1N4858B	S	1M120ZS5 †	1N4728	DZ						120	1.2	5.0	1.2W
1N4859	S	1M130ZS10 †	1N4728	DZ						130	1.9	20	1.2W
1N4859A	S	1M130ZS10 †	1N4728	DZ						130	1.9	10	1.2W
1N4859B	S	1M130ZS5 †	1N4728	DZ						130	1.9	5.0	1.2W
1N4860	S	1M150ZS10 †	1N4728	DZ						150	1.7	20	1.2W
1N4860A	S	1M150ZS10 †	1N4728	DZ						150	1.7	10	1.2W
1N4860B	S	1M150ZS5 †	1N4728	DZ						150	1.7	5.0	1.2W
1N4861	S			DS	50	1.2	0.1A	2.0N	1.0				
1N4862	S			DS	50	1.1	0.1A	5.0N	1.0				
1N4863	S			DS	50	1.2	0.1A	50N	7.0				
1N4864	S			DS	80	1.1	0.1A	0.1*	9.0				
1N4865	S			R	1500	2.4	1.25	0.6	150				
1N4866	S			R	2500	3.6	1.25	0.6	150				
1N4867	S			R	3000	4.8	1.25	0.6	150				
1N4868	S			R	5000	8.4	1.25	0.6	150				
1N4869	S			R	7500	12	1.25	0.6	150				
1N4870	S			R	10K	16	1.25	0.6	150				
1N4871	S			R	12K	18	1.25	0.6	150				
1N4872	S			R	15K	23	1.25	0.6	150				
1N4873	S			R	20K	30	1.25	0.6	150				
1N4874	S			R	25K	38	1.25	0.6	150				

†See page 1-1a for ordering information.



**1N4875-1N4922A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °/°C	I <sub>ZT</sub> mA	Temp Range
1N4875	S	MR1221SB	MR1220	R	30K	46	1.25	0.6	150				
1N4876	S			R	40K	60	1.25	0.6	150				
1N4877	S			R	50K	76	1.25	0.6	150				
1N4878	S			R	100	1.3	100	5.0	1500				
1N4879	S			R	100	1.3	160	10	2200				
1N4880	S			R	100	1.2	250	10	4000				
1N4881	S	1N4747	1N4728	DZ						40	20	10	3.0W
1N4882	S	1N4753	1N4728	DZ						20	36	10	3.0W
1N4883	S	1N4742A	1N4728	DZ						65	12	5.0	3.0W
1N4884	S	1N4747A	1N4728	DZ						40	20	5.0	3.0W
1N4885 }		Varactor Diodes, see Table on Page 1-100											
1N4886 }													
1N4887	S	1N3000B	1N2970	R	75K	115	1.25	0.6	150				
1N4888	S			DS	12	1.0	20M	50N					
1N4889	S			DZ						62	20	5.0	5.0W
1N4890	S			DR						6.35	0.001	7.5	25/100
1N4890A	S			DR						6.35	0.001	7.5	-55/100
1N4891	S			DR						6.35	0.0005	7.5	25/100
1N4891A	S			DR						6.35	0.0005	7.5	-55/100
1N4892	S			DR						6.35	0.001	7.5	25/100
1N4892A	S			DR						6.35	0.001	7.5	-55/100
1N4893	S			DR						6.35	0.0005	7.5	25/100
1N4893A	S			DR						6.35	0.0005	7.5	-55/100
1N4894	S	MZ610 *	MZ600	DR						6.35	0.001	7.5	25/100
1N4894A	S	MZ610 *	MZ600	DR						6.35	0.001	7.5	-55/100
1N4895	S	MZ610 *	MZ600	DR						6.35	0.0005	7.5	25/100
1N4895A	S	MZ610 *	MZ600	DR						6.35	0.0005	7.5	-55/100
1N4896	S		1N4765	DR						12.8	0.01	0.5	25/100
1N4896A	S		1N4765	DR						12.8	0.01	0.5	-55/100
1N4897	S		1N4765	DR						12.8	0.005	0.5	25/100
1N4897A	S		1N4765	DR						12.8	0.005	0.5	-55/100
1N4898	S		1N4765	DR						12.8	0.002	0.5	25/100
1N4898A	S		1N4765	DR						12.8	0.002	0.5	-55/100
1N4899	S		1N4765	DR						12.8	0.001	0.5	25/100
1N4899A	S		1N4765	DR						12.8	0.001	0.5	-55/100
1N4900	S		1N4765	DR						12.8	0.01	1.0	25/100
1N4900A	S		1N4765	DR						12.8	0.01	1.0	-55/100
1N4901	S		1N4765	DR						12.8	0.005	1.0	25/100
1N4901A	S		1N4765	DR						12.8	0.005	1.0	-55/100
1N4902	S		1N4765	DR						12.8	0.002	1.0	25/100
1N4902A	S		1N4765	DR						12.8	0.002	1.0	-55/100
1N4903	S		1N4765	DR						12.8	0.001	1.0	25/100
1N4903A	S		1N4765	DR						12.8	0.001	1.0	-55/100
1N4904	S		1N4765	DR						12.8	0.01	2.0	25/100
1N4904A	S		1N4765	DR						12.8	0.01	2.0	-55/100
1N4905	S		1N4765	DR						12.8	0.005	2.0	25/100
1N4905A	S		1N4765	DR						12.8	0.005	2.0	-55/100
1N4906	S		1N4765	DR						12.8	0.002	2.0	25/100
1N4906A	S		1N4765	DR						12.8	0.002	2.0	-55/100
1N4907	S		1N4765	DR						12.8	0.001	2.0	25/100
1N4907A	S		1N4765	DR						12.8	0.001	2.0	-55/100
1N4908	S		1N4765	DR						12.8	0.01	4.0	25/100
1N4908A	S		1N4765	DR						12.8	0.01	4.0	-55/100
1N4909	S		1N4765	DR						12.8	0.005	4.0	25/100
1N4909A	S		1N4765	DR						12.8	0.005	4.0	-55/100
1N4910	S		1N4765	DR						12.8	0.002	4.0	25/100
1N4910A	S		1N4765	DR						12.8	0.002	4.0	-55/100
1N4911	S		1N4765	DR						12.8	0.001	4.0	25/100
1N4911A	S		1N4765	DR						12.8	0.001	4.0	-55/100
1N4912	S		1N4765	DR						12.8	0.01	7.5	25/100
1N4912A	S		1N4765	DR						12.8	0.01	7.5	-55/100
1N4913	S		1N4765	DR						12.8	0.005	7.5	25/100
1N4913A	S		1N4765	DR						12.8	0.005	7.5	-55/100
1N4914	S		1N4765	DR						12.8	0.002	7.5	25/100
1N4914A	S		1N4765	DR						12.8	0.002	7.5	-55/100
1N4915	S		1N4765	DR						12.8	0.001	7.5	25/100
1N4915A	S		1N4765	DR						12.8	0.001	7.5	-55/100
1N4916	S		1N4765	DR						19.2	0.01	0.5	25/100
1N4916A	S		1N4765	DR						19.2	0.01	0.5	-55/100
1N4917	S		1N4765	DR						19.2	0.005	0.5	25/100
1N4917A	S		1N4765	DR						19.2	0.005	0.5	-55/100
1N4918	S		1N4765	DR						19.2	0.002	0.5	25/100
1N4918A	S		1N4765	DR						19.2	0.002	0.5	-55/100
1N4919	S		1N4765	DR						19.2	0.01	1.0	25/100
1N4919A	S		1N4765	DR						19.2	0.01	1.0	-55/100
1N4920	S		1N4765	DR						19.2	0.005	1.0	25/100
1N4920A	S		1N4765	DR						19.2	0.005	1.0	-55/100
1N4921	S		1N4765	DR						19.2	0.002	1.0	25/100
1N4921A	S		1N4765	DR						19.2	0.002	1.0	-55/100
1N4922	S		1N4765	DR						19.2	0.01	2.0	25/100
1N4922A	S		1N4765	DR						19.2	0.01	2.0	-55/100

Replacement \* denotes exact device type replacement available on request.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4923	S		1N4765	DR						19.2	0.005	2.0	25/100
1N4923A	S		1N4765	DR						19.2	0.005	2.0	-55/100
1N4924	S		1N4765	DR						19.2	0.002	2.0	25/100
1N4924A	S		1N4765	DR						19.2	0.002	2.0	-55/100
1N4925	S		1N4765	DR						19.2	0.01	4.0	25/100
1N4925A	S		1N4765	DR						19.2	0.01	4.0	-55/100
1N4926	S		1N4765	DR						19.2	0.005	4.0	25/100
1N4926A	S		1N4765	DR						19.2	0.005	4.0	-55/100
1N4927	S		1N4765	DR						19.2	0.002	4.0	25/100
1N4927A	S		1N4765	DR						19.2	0.002	4.0	-55/100
1N4928	S		1N4765	DR						19.2	0.001	4.0	25/100
1N4928A	S		1N4765	DR						19.2	0.001	4.0	-55/100
1N4929	S		1N4765	DR						19.2	0.01	7.5	25/100
1N4929A	S		1N4765	DR						19.2	0.01	7.5	-55/100
1N4930	S		1N4765	DR						19.2	0.005	7.5	25/100
1N4930A	S		1N4765	DR						19.2	0.005	7.5	-55/100
1N4931	S		1N4765	DR						19.2	0.002	7.5	25/100
1N4931A	S		1N4765	DR						19.2	0.002	7.5	-55/100
1N4932	S		1N4765	DR						19.2	0.001	7.5	25/100
1N4932A	S		1N4765	DR						19.2	0.001	7.5	-55/100
1N4933	S		1N4933	.R	50	1.2	1.0	0.3	30				
1N4934	S		1N4933	.R	100	1.2	1.0	0.3	30				
1N4935	S		1N4933	.R	200	1.2	1.0	0.3	30				
1N4936	S		1N4933	.R	400	1.2	1.0	0.3	30				
1N4937	S		1N4933	.R	600	1.2	1.0	0.3	30				
1N4938	S		DS		200	1.10	0.1A	0.1*	50				
1N4939	G	Microwave Ka-band Mixer, NF = 10.5 dB											
1N4940	G												
1N4941		Microwave Ka-band Mixer, f = 9,375 MHz. NF = 6.5 dB											
1N4942	S												
1N4943	S		DS		200	1.5	3.0	0.5M	150N				
1N4944	S		DS		300	1.5	3.0	0.5M	150N				
1N4945	S		DS		400	1.5	3.0	0.5M	150N				
1N4946	S		DS		500	1.5	3.0	0.5M	150N				
1N4947	S		DS		600	1.5	3.0	0.5M	250N				
1N4948	S		DS		800	1.5	3.0	0.5M	300N				
			DS		1000	1.5	3.0	0.5M	500N				
1N4950	S		DS		25	0.53	1.0M	0.1M					
1N4951	S		DS		20	0.85	1.0M	0.1*					
1N4952	S		DS		50	0.85	1.0M	0.1*					
1N4954	S	1N5342B	1N5333	DZ						6.8	175	5.0	3.0W
1N4955	S	1N5343B	1N5333	DZ						7.5	175	5.0	3.0W
1N4956	S	1N5344B	1N5333	DZ						8.2	150	5.0	3.0W
1N4957	S	1N5346B	1N5333	DZ						9.1	150	5.0	3.0W
1N4958	S	1N5347B	1N5333	DZ						10	125	5.0	3.0W
1N4959	S	1N5348B	1N5333	DZ						11	120	5.0	3.0W
1N4960	S	1N5349B	1N5333	DZ						12	100	5.0	3.0W
1N4961	S	1N5350B	1N5333	DZ						13	100	5.0	3.0W
1N4962	S	1N5352B	1N5333	DZ						15	75	5.0	3.0W
1N4963	S	1N5353B	1N5333	DZ						16	5.0	5.0	3.0W
1N4964	S	1N5355B	1N5333	DZ						18	65	5.0	3.0W
1N4965	S	1N5357B	1N5333	DZ						20	65	5.0	3.0W
1N4966	S	1N5358B	1N5333	DZ						22	50	5.0	3.0W
1N4967	S	1N5359B	1N5333	DZ						24	50	5.0	3.0W
1N4968	S	1N5361B	1N5333	DZ						27	50	5.0	3.0W
1N4969	S	1N5363B	1N5333	DZ						30	40	5.0	3.0W
1N4970	S	1N5364B	1N5333	DZ						33	40	5.0	3.0W
1N4971	S	1N5365B	1N5333	DZ						36	30	5.0	3.0W
1N4972	S	1N5366B	1N5333	DZ						39	30	5.0	3.0W
1N4973	S	1N5367B	1N5333	DZ						43	30	5.0	3.0W
1N4974	S	1N5368B	1N5333	DZ						47	25	5.0	3.0W
1N4975	S	1N5369B	1N5333	DZ						51	25	5.0	3.0W
1N4976	S	1N5370B	1N5333	DZ						56	20	5.0	3.0W
1N4977	S	1N5372B	1N5333	DZ						62	20	5.0	3.0W
1N4978	S	1N5373B	1N5333	DZ						68	20	5.0	3.0W
1N4979	S	1N5374B	1N5333	DZ						75	20	5.0	3.0W
1N4980	S	1N5375B	1N5333	DZ						82	15	5.0	3.0W
1N4981	S	1N5377B	1N5333	DZ						91	15	5.0	3.0W
1N4982	S	1N5378B	1N5333	DZ						100	12	5.0	3.0W
1N4983	S	1N5379B	1N5333	DZ						110	12	5.0	3.0W
1N4984	S	1N5380B	1N5333	DZ						120	10	5.0	3.0W
1N4985	S	1N5381B	1N5333	DZ						130	19	5.0	3.0W
1N4986	S	1N5383B	1N5333	DZ						150	8.0	5.0	3.0W
1N4987	S	1N5384B	1N5333	DZ						160	8.0	5.0	3.0W
1N4988	S	1N5386B	1N5333	DZ						180	5.0	5.0	3.0W
1N4989	S	1N5388B	1N5333	DZ						200	5.0	5.0	3.0W
1N4990	S	5M110ZSB5		DZ						220	5.0	5.0	3.0W
1N4991	S	5M180ZSB5		DZ						240	5.0	5.0	3.0W
1N4992	S	5M135ZSB5		DZ						270	5.0	5.0	3.0W
1N4993	S	5M150ZSB5		DZ						300	4.0	5.0	3.0W
1N4994	S	5M165ZSB5		DZ						330	4.0	5.0	3.0W
1N4995	S	5M180ZSB5		DZ						360	3.0	5.0	3.0W
1N4996	S	5M195ZSB5		DZ						390	3.0	5.0	3.0W

\*R t<sub>rr</sub> @ 200 ns



**1N4997-1N5043**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N4997	S		1N4719	R	50	1.0	3.0	2.0	300				
1N4998	S		1N4719	R	100	1.0	3.0	2.0	300				
1N4999	S		1N4719	R	200	1.0	3.0	2.0	300				
1N5000	S		1N4719	R	400	1.0	3.0	2.0	300				
1N5001	S		1N4719	R	600	1.0	3.0	1.0	300				
1N5002	S		1N4719	R	800	1.0	3.0	1.0	300				
1N5003	S		1N4719	R	1000	1.0	3.0	1.0	300				
1N5004	S			R	100	1.3	1.0	1.0	35				
1N5005	S			R	200	1.3	1.0	1.0	35				
1N5006	S			R	400	1.3	1.0	1.0	35				
1N5007	S			R	600	1.3	1.0	1.0	35				
1N5008	S	1N4728	1N4728	DZ						3.3	189	10	2.5W
1N5008A	S	1N4728A	1N4728	DZ						3.3	189	5.0	2.5W
1N5009	S	1N4729	1N4728	DZ						3.6	173	10	2.5W
1N5009A	S	1N4729A	1N4728	DZ						3.6	173	5.0	2.5W
1N5010	S	1N4730	1N4728	DZ						3.9	160	10	2.5W
1N5010A	S	1N4730A	1N4728	DZ						3.9	160	5.0	2.5W
1N5011	S	1N4731	1N4728	DZ						4.3	145	10	2.5W
1N5011A	S	1N4731A	1N4728	DZ						4.3	145	5.0	2.5W
1N5012	S	1N4732	1N4728	DZ						4.7	133	10	2.5W
1N5012A	S	1N4732A	1N4728	DZ						4.7	133	5.0	2.5W
1N5013	S	1N4733	1N4728	DZ						5.1	122	10	2.5W
1N5013A	S	1N4733A	1N4728	DZ						5.1	122	5.0	2.5W
1N5014	S	1N4734	1N4728	DZ						5.6	111	10	2.5W
1N5014A	S	1N4734A	1N4728	DZ						5.6	111	5.0	2.5W
1N5015	S	1N4735	1N4728	DZ						6.2	104	10	2.5W
1N5015A	S	1N4735A	1N4728	DZ						6.2	104	5.0	2.5W
1N5016	S	1N4736	1N4728	DZ						6.8	92	10	2.5W
1N5016A	S	1N4736A	1N4728	DZ						6.8	92	5.0	2.5W
1N5017	S	1N4737	1N4728	DZ						7.5	83	10	2.5W
1N5017A	S	1N4737A	1N4728	DZ						7.5	83	5.0	2.5W
1N5018	S	1N4738	1N4728	DZ						8.2	76	10	2.5W
1N5018A	S	1N4738A	1N4728	DZ						8.2	76	5.0	2.5W
1N5019	S	1N4739	1N4728	DZ						9.1	69	10	2.5W
1N5019A	S	1N4739A	1N4728	DZ						9.1	69	5.0	2.5W
1N5020	S	1N4740	1N4728	DZ						10	62	10	2.5W
1N5020A	S	1N4740A	1N4728	DZ						10	62	5.0	2.5W
1N5021	S	1N4741	1N4728	DZ						11	57	10	2.5W
1N5021A	S	1N4741A	1N4728	DZ						11	57	5.0	2.5W
1N5022	S	1N4742	1N4728	DZ						12	52	10	2.5W
1N5022A	S	1N4742A	1N4728	DZ						12	52	5.0	2.5W
1N5023	S	1N4743	1N4728	DZ						13	48	10	2.5W
1N5023A	S	1N4743A	1N4728	DZ						13	48	5.0	2.5W
1N5024	S	1M14ZS10		DZ						14	45	10	2.5W
1N5024A	S	1M14ZS5		DZ						14	45	5.0	2.5W
1N5025	S	1N4744	1N4728	DZ						15	42	10	2.5W
1N5025A	S	1N4744A	1N4728	DZ						15	42	5.0	2.5W
1N5026	S	1N4745	1N4728	DZ						16	39	10	2.5W
1N5026A	S	1N4745A	1N4728	DZ						16	39	5.0	2.5W
1N5027	S	1M17ZS10		DZ						17	37	10	2.5W
1N5027A	S	1M17ZS5		DZ						17	37	5.0	2.5W
1N5028	S	1N4746	1N4728	DZ						18	35	10	2.5W
1N5028A	S	1N4746A	1N4728	DZ						18	35	5.0	2.5W
1N5029	S	1M19ZS10		DZ						19	33	10	2.5W
1N5029A	S	1M19ZS5		DZ						19	33	5.0	2.5W
1N5030	S	1N4747	1N4728	DZ						20	31	10	2.5W
1N5030A	S	1N4747A	1N4728	DZ						20	31	5.0	2.5W
1N5031	S	1N4748	1N4728	DZ						22	28	10	2.5W
1N5031A	S	1N4748A	1N4728	DZ						22	28	5.0	2.5W
1N5032	S	1N4749	1N4728	DZ						24	26	10	2.5W
1N5032A	S	1N4749A	1N4728	DZ						24	26	5.0	2.5W
1N5033	S	1M25ZS10		DZ						25	25	10	2.5W
1N5033A	S	1M25ZS5		DZ						25	25	5.0	2.5W
1N5034	S	1N4750	1N4728	DZ						27	23	10	2.5W
1N5034A	S	1N4750A	1N4728	DZ						27	23	5.0	2.5W
1N5035	S	1N4751	1N4728	DZ						30	21	10	2.5W
1N5035A	S	1N4751A	1N4728	DZ						30	21	5.0	2.5W
1N5036	S	1N4752	1N4728	DZ						33	19	10	2.5W
1N5036A	S	1N4752A	1N4728	DZ						33	19	5.0	2.5W
1N5037	S	1N4753	1N4728	DZ						36	17	10	2.5W
1N5037A	S	1N4753A	1N4728	DZ						36	17	5.0	2.5W
1N5038	S	1N4754	1N4728	DZ						39	16	10	2.5W
1N5038A	S	1N4754A	1N4728	DZ						39	16	5.0	2.5W
1N5039	S	1N4755	1N4728	DZ						43	15	10	2.5W
1N5039A	S	1N4755A	1N4728	DZ						43	15	5.0	2.5W
1N5040	S	1M45ZS10		DZ						45	14	10	2.5W
1N5040A	S	1M45ZS5		DZ						45	14	5.0	2.5W
1N5041	S	1N4756	1N4728	DZ						47	13	10	2.5W
1N5041A	S	1N4756A	1N4728	DZ						47	13	5.0	2.5W
1N5042	S	1M50ZS10		DZ						50	12	10	2.5W
1N5042A	S	1M50ZS5		DZ						50	12	5.0	2.5W
1N5043	S	1N4757	1N4728	DZ						51	12	10	2.5W



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ (volts)	@ $I_F$	$I_R$	$t_r$ ( $\mu s$ )	$V_Z$ (nom)	$T_C$ °C	$I_{ZT}$ mA	Temp Range
1N5043A	S	1N4757A	1N4728	DZ						51	12	5.0	2.5W
1N5044	S	1M52ZS10	1N4728	DZ						52	12	1.0	2.5W
1N5044A	S	1M52ZS5	1N4728	DZ						52	12	5.0	2.5W
1N5045	S	1N4758	1N4728	DZ						56	11	1.0	2.5W
1N5045A	S	1N4758A	1N4728	DZ						56	11	5.0	2.5W
1N5046	S	1N4759	1N4728	DZ						62	10	1.0	2.5W
1N5046A	S	1N4759A	1N4728	DZ						62	10	5.0	2.5W
1N5047	S	1N4760	1N4728	DZ						68	9.2	1.0	2.5W
1N5047A	S	1N4760A	1N4728	DZ						68	9.2	5.0	2.5W
1N5048	S	1N4761	1N4728	DZ						75	8.3	1.0	2.5W
1N5048A	S	1N4761A	1N4728	DZ						75	8.3	5.0	2.5W
1N5049	S	1N4762	1N4728	DZ						82	7.6	1.0	2.5W
1N5049A	S	1N4762A	1N4728	DZ						82	7.6	5.0	2.5W
1N5050	S	1N4763	1N4728	DZ						91	6.9	1.0	2.5W
1N5050A	S	1N4763A	1N4728	DZ						91	6.9	5.0	2.5W
1N5051	S	1N4764	1N4728	DZ						100	6.2	1.0	2.5W
1N5051A	S	1N4764A	1N4728	DZ						100	6.2	5.0	2.5W
1N5052	S	1N4006	1N4001	R	700	1.3	1.5	0.5	50				
1N5053	S	1N4006	1N4001	R	800	1.3	1.5	0.5	50				
1N5054	S	1N4007	1N4001	R	1000	1.3	1.5	0.5	50				
1N5055	S			R	100	1.4	1.0	0.25	30				
1N5056	S			R	200	1.4	1.0	0.25	30				
1N5057	S			R	300	1.4	0.8	0.25	30				
1N5058	S			R	400	1.4	0.8	0.25	30				
1N5059	S	1N4003	1N4001	R	200	1.0	1.5	0.3	100				
1N5060	S	1N4004	1N4001	R	400	1.0	1.5	0.3	100				
1N5061	S	1N4005	1N4001	R	600	1.0	1.5	0.2	100				
1N5062	S	1N4006	1N4001	R	800	1.0	1.25	0.2	100				
1N5063	S	1N4736A	1N4728	DZ						6.8	75	5.0	3.0W
1N5064	S	1N4737A	1N4728	DZ						7.5	75	5.0	3.0W
1N5065	S	1N4738A	1N4728	DZ						8.2	75	5.0	3.0W
1N5066	S	1N4739A	1N4728	DZ						9.1	75	5.0	3.0W
1N5067	S	1N4740A	1N4728	DZ						11	75	5.0	3.0W
1N5068	S	1N4741A	1N4728	DZ						13	50	5.0	3.0W
1N5069	S	1N4743A	1N4728	DZ						14	50	5.0	3.0W
1N5070	S	1M14ZS5											
1N5071	S	1N4744A	1N4728	DZ						15	50	5.0	3.0W
1N5072	S	1N4745A	1N4728	DZ						16	50	5.0	3.0W
1N5073	S	1N4746A	1N4728	DZ						18	40	5.0	3.0W
1N5074	S	1N4748A	1N4728	DZ						22	30	5.0	3.0W
1N5075	S	1N4749A	1N4728	DZ						24	30	5.0	3.0W
1N5076	S	1N4750A	1N4728	DZ						27	25	5.0	3.0W
1N5077	S	1N4751A	1N4728	DZ						30	25	5.0	3.0W
1N5078	S	1N4752A	1N4728	DZ						33	20	5.0	3.0W
1N5079	S	1N4753A	1N4728	DZ						36	20	5.0	3.0W
1N5080	S	1N4754A	1N4728	DZ						39	20	5.0	3.0W
1N5081	S	1M40ZS5								40	20	5.0	3.0W
1N5082	S	1N4755A	1N4728	DZ						43	15	5.0	3.0W
1N5083	S	1M45ZS5								45	15	5.0	3.0W
1N5084	S	1N4756A	1N4728	DZ						47	15	5.0	3.0W
1N5085	S	1M50ZS5								50	15	5.0	3.0W
1N5086	S	1N4757A	1N4728	DZ						51	15	5.0	3.0W
1N5087	S	1N4758A	1N4728	DZ						56	10	5.0	3.0W
1N5088	S	1M60ZS5								60	10	5.0	3.0W
1N5089	S	1N4759A	1N4728	DZ						62	10	5.0	3.0W
1N5090	S	1N4760A	1N4728	DZ						68	10	5.0	3.0W
1N5091	S	1M70ZS5								70	10	5.0	3.0W
1N5092	S	1N4761A	1N4728	DZ						75	10	5.0	3.0W
1N5093	S	1M80ZS5								80	10	5.0	3.0W
1N5094	S	1N4762A	1N4728	DZ						82	10	5.0	3.0W
1N5095	S	1N4763A †	1N4728	DZ						91	8.0	5.0	3.0W
1N5096	S	1M110ZS5 †	1N4728	DZ						110	5.0	5.0	3.0W
1N5097	S	1M120ZS5 †	1N4728	DZ						120	5.0	5.0	3.0W
1N5098	S	1M130ZS5 †	1N4728	DZ						130	5.0	5.0	3.0W
1N5099	S	1M140ZS5 †	1N4728	DZ						140	5.0	5.0	3.0W
1N5100	S	1M160ZS5 †	1N4728	DZ						160	4.0	5.0	3.0W
1N5101	S	1M170ZS5 †	1N4728	DZ						170	4.0	5.0	3.0W
1N5102	S	1M180ZS5 †	1N4728	DZ						180	4.0	5.0	3.0W
1N5103	S	1M190ZS5 †	1N4728	DZ						190	4.0	5.0	3.0W
1N5104	S	1M200ZS5 †	1N4728	DZ						200	3.0	5.0	3.0W
1N5105	S	1M110ZSB5 †	1N4728	DZ						220	3.0	5.0	3.0W
1N5106	S	1M120ZSB5 †	1N4728	DZ						240	3.0	5.0	3.0W
1N5107	S	1M130ZSB5 †	1N4728	DZ						260	3.0	5.0	3.0W
1N5108	S	1M135ZSB5 †	1N4728	DZ						270	3.0	5.0	3.0W
1N5109	S	1M140ZSB5 †	1N4728	DZ						280	3.0	5.0	3.0W
1N5110	S	1M150ZSB5 †	1N4728	DZ						300	3.0	5.0	3.0W
1N5111	S	1M160ZSB5 †	1N4728	DZ						320	2.0	5.0	3.0W
1N5112	S	1M165ZSB5 †	1N4728	DZ						330	2.0	5.0	3.0W
1N5113	S	1M170ZSB5 †	1N4728	DZ						340	2.0	5.0	3.0W
1N5114	S	1M180ZSB5 †	1N4728	DZ						360	2.0	5.0	3.0W
1N5115	S	1M190ZSB5 †	1N4728	DZ						380	2.0	5.0	3.0W
1N5116	S	1M195ZSB5 †	1N4728	DZ						390	2.0	5.0	3.0W

†See page 1-1a for ordering information.



**1N5117-1N5188A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °/°C	I <sub>ZT</sub> mA	Temp Range
1N5117	S	1M200ZSB5 †		DZ						400	2.0	5.0	3.0W
1N5118	S	1N5341B	1N5333	DZ						14	100	5.0	5.0W
1N5119	S	5M40ZS5 †		DZ						40	30	5.0	5.0W
1N5120	S	5M45ZS5 †		DZ						45	30	5.0	5.0W
1N5121	S	5M50ZS5 †		DZ						50	25	5.0	5.0W
1N5122	S	1N5371B	1N5333	DZ						60	20	5.0	5.0W
1N5123	S	5M70ZS5 †		DZ						70	20	5.0	5.0W
1N5124	S	5M80ZS5 †		DZ						80	15	5.0	5.0W
1N5125	S	5M90ZS5 †		DZ						90	15	5.0	5.0W
1N5126	S	1N5382B	1N5333	DZ						140	8.0	5.0	5.0W
1N5127	S	1N5385B	1N5333	DZ						170	8.0	5.0	5.0W
1N5128	S	1N5387B	1N5333	DZ						190	5.0	5.0	5.0W
1N5129	S	5M130ZSB5 †		DZ						260	5.0	5.0	5.0W
1N5130	S	5M140ZSB5 †		DZ						280	4.0	5.0	5.0W
1N5131	S	5M160ZSB5 †		DZ						320	4.0	5.0	5.0W
1N5132	S	5M170ZSB5 †		DZ						340	4.0	5.0	5.0W
1N5133	S	5M190ZSB5 †		DZ						380	3.0	5.0	5.0W
1N5134	S	5M200ZSB5 †		DZ							3.0	5.0	5.0W
1N5136 thru 1N5148		Varactor Diodes, see Table on Page 1-100											
1N5136A thru 1N5148A		Varactor Diodes, see Table on Page 1-100											
1N5150A 1N5152A 1N5153A		Varactor Diodes, see Table on Page 1-100											
1N5155A 1N5156 thru 1N5157		Varactor Diodes, see Table on Page 1-100											
1N5158 thru 1N5160		4-Layer Diodes, see Table on Page 1-96											
1N5163 1N5164	S	Harmonic Generator											
1N5165,A thru 1N5167,A		Hot Carrier Diodes											
1N5168 1N5169		Hot Carrier Diode											
1N5170	S	Hot Carrier Diode		R	15	1.2	2.0	0.025	200				
1N5171	S			R	50	1.2	2.0	0.025	200				
1N5172	S			R	100	1.2	2.0	0.025	200				
1N5173	S			R	300	1.2	2.0	0.025	200				
1N5174	S			R	400	1.2	2.0	0.025	200				
1N5175	S			R	500	1.2	2.0	0.025	200				
1N5176	S			R	600	1.2	2.0	0.025	200				
1N5177	S			R	800	1.2	2.0	0.025	200				
1N5178	S			R	1000	1.2	2.0	0.025	200				
1N5179	S			DS		2.8	1.0	50	200				
1N5180	S			R	100	1.25	4.0	100					
1N5181	S			R	4000		0.6	0.02					
1N5182	S			R	5000		0.6	0.02					
1N5183	S			R	7500		0.6	0.02					
1N5184	S			R	10000		0.6	0.02					
1N5185	S			R	50	1.1	3.0	0.100	80				
1N5185A	S			R	50	1.1	4.0	0.022	80				
1N5186	S			R	100	1.1	3.0	0.100	80				
1N5186A	S			R	100	1.1	4.0	0.022	80				
1N5187	S			R	200	1.1	3.0	0.100	80				
1N5187A	S			R	200	1.1	4.0	0.022	80				
1N5188	S			R	400	1.1	3.0	0.100	80				
1N5188A	S			R	400	1.1	4.0	0.022	80				

†See page 1-1a for ordering information.



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	t <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N5189	S			R	500	1.1	3.0	0.100	80				
1N5189A	S			R	500	1.1	4.0	0.022	80				
1N5190	S			R	600	1.1	3.0	0.100	80				
1N5190A	S			R	600	1.1	4.0	0.022	80				
1N5197	S			R	50		2.0	0.1					
1N5198	S			R	100		2.0	0.1					
1N5199	S			R	200		2.0	0.1					
1N5200	S			R	400		2.0	0.1					
1N5201	S			R	600		2.0	0.1					
1N5206	S			R	400	1.1	2.0	0.003	25				
1N5207	S			R	400	1.25	4.0	0.005	100				
1N5211	S			R	200	1.2	1.0	0.2	50				
1N5212	S			R	400	1.2	1.0	0.2	50				
1N5213	S			R	600	1.2	1.0	0.2	50				
1N5214	S			R	800	1.2	0.75	0.2	50				
1N5215	S			R	200	1.2	1.0	0.2	50				
1N5216	S			R	400	1.2	1.0	0.2	50				
1N5217	S			R	600	1.2	1.0	0.2	50				
1N5218	S			R	800	1.2	0.75	0.2	50				
1N5219	S			DS	30	1.0	50	50	0.002				
1N5220	S			DS	30	1.2	50	50					
1N5221	S		1N5221	DZ						2.4	20	10	500M
1N5221A	S		1N5221	DZ						2.4	20	10	500M
1N5221B	S		1N5221	DZ						2.4	20	5.0	500M
1N5222	S		1N5221	DZ						2.5	20	10	500M
1N5222A	S		1N5221	DZ						2.5	20	10	500M
1N5222B	S		1N5221	DZ						2.5	20	5.0	500M
1N5223	S		1N5221	DZ						2.7	20	10	500M
1N5223A	S		1N5221	DZ						2.7	20	10	500M
1N5223B	S		1N5221	DZ						2.7	20	5.0	500M
1N5224	S		1N5221	DZ						2.8	20	10	500M
1N5224A	S		1N5221	DZ						2.8	20	10	500M
1N5224B	S		1N5221	DZ						2.8	20	5.0	500M
1N5225	S		1N5221	DZ						3.0	20	10	500M
1N5225A	S		1N5221	DZ						3.0	20	10	500M
1N5225B	S		1N5221	DZ						3.0	20	5.0	500M
1N5226	S		1N5221	DZ						3.3	20	10	500M
1N5226A	S		1N5221	DZ						3.3	20	10	500M
1N5226B	S		1N5221	DZ						3.3	20	5.0	500M
1N5227	S		1N5221	DZ						3.6	20	10	500M
1N5227A	S		1N5221	DZ						3.6	20	10	500M
1N5227B	S		1N5221	DZ						3.6	20	5.0	500M
1N5228	S		1N5221	DZ						3.9	20	10	500M
1N5228A	S		1N5221	DZ						3.9	20	10	500M
1N5228B	S		1N5221	DZ						3.9	20	5.0	500M
1N5229	S		1N5221	DZ						4.3	20	10	500M
1N5229A	S		1N5221	DZ						4.3	20	10	500M
1N5229B	S		1N5221	DZ						4.3	20	5.0	500M
1N5230	S		1N5221	DZ						4.7	20	10	500M
1N5230A	S		1N5221	DZ						4.7	20	10	500M
1N5230B	S		1N5221	DZ						4.7	20	5.0	500M
1N5231	S		1N5221	DZ						5.1	20	10	500M
1N5231A	S		1N5221	DZ						5.1	20	10	500M
1N5231B	S		1N5221	DZ						5.1	20	5.0	500M
1N5232	S		1N5221	DZ						5.6	20	10	500M
1N5232A	S		1N5221	DZ						5.6	20	10	500M
1N5232B	S		1N5221	DZ						5.6	20	5.0	500M
1N5233	S		1N5221	DZ						6.0	20	10	500M
1N5233A	S		1N5221	DZ						6.0	20	10	500M
1N5233B	S		1N5221	DZ						6.0	20	5.0	500M
1N5234	S		1N5221	DZ						6.2	20	10	500M
1N5234A	S		1N5221	DZ						6.2	20	10	500M



# 1N5234B-1N5261B

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES				t <sub>rr</sub> (μs)	REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>		V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N5234B	S		1N5221	DZ						6.2	20	5.0	500M
1N5235	S		1N5221	DZ						6.8	20	10	500M
1N5235A	S		1N5221	DZ						6.8	20	10	500M
1N5235B	S		1N5221	DZ						6.8	20	5.0	500M
1N5236	S		1N5221	DZ						7.5	20	10	500M
1N5236A	S		1N5221	DZ						7.5	20	10	500M
1N5236B	S		1N5221	DZ						7.5	20	5.0	500M
1N5237	S		1N5221	DZ						8.2	20	10	500M
1N5237A	S		1N5221	DZ						8.2	20	10	500M
1N5237B	S		1N5221	DZ						8.2	20	5.0	500M
1N5238	S		1N5221	DZ						8.7	20	10	500M
1N5238A	S		1N5221	DZ						8.7	20	10	500M
1N5238B	S		1N5221	DZ						8.7	20	5.0	500M
1N5239	S		1N5221	DZ						9.1	20	10	500M
1N5239A	S		1N5221	DZ						9.1	20	10	500M
1N5239B	S		1N5221	DZ						9.1	20	5.0	500M
1N5240	S		1N5221	DZ						10	20	10	500M
1N5240A	S		1N5221	DZ						10	20	10	500M
1N5240B	S		1N5221	DZ						10	20	5.0	500M
1N5241	S		1N5221	DZ						11	20	10	500M
1N5241A	S		1N5221	DZ						11	20	10	500M
1N5241B	S		1N5221	DZ						11	20	5.0	500M
1N5242	S		1N5221	DZ						12	20	10	500M
1N5242A	S		1N5221	DZ						12	20	10	500M
1N5242B	S		1N5221	DZ						12	20	5.0	500M
1N5243	S		1N5221	DZ						13	9.5	10	500M
1N5243A	S		1N5221	DZ						13	9.5	10	500M
1N5243B	S		1N5221	DZ						13	9.5	5.0	500M
1N5244	S		1N5221	DZ						14	9.0	10	500M
1N5244A	S		1N5221	DZ						14	9.0	10	500M
1N5244B	S		1N5221	DZ						14	9.0	5.0	500M
1N5245	S		1N5221	DZ						15	8.5	10	500M
1N5245A	S		1N5221	DZ						15	8.5	10	500M
1N5245B	S		1N5221	DZ						15	8.5	5.0	500M
1N5246	S		1N5221	DZ						16	7.8	10	500M
1N5246A	S		1N5221	DZ						16	7.8	10	500M
1N5246B	S		1N5221	DZ						16	7.8	5.0	500M
1N5247	S		1N5221	DZ						17	7.4	10	500M
1N5247A	S		1N5221	DZ						17	7.4	10	500M
1N5247B	S		1N5221	DZ						17	7.4	5.0	500M
1N5248	S		1N5221	DZ						18	7.0	10	500M
1N5248A	S		1N5221	DZ						18	7.0	10	500M
1N5248B	S		1N5221	DZ						18	7.0	5.0	500M
1N5249	S		1N5221	DZ						19	6.6	10	500M
1N5249A	S		1N5221	DZ						19	6.6	10	500M
1N5249B	S		1N5221	DZ						19	6.6	5.0	500M
1N5250	S		1N5221	DZ						20	6.2	10	500M
1N5250A	S		1N5221	DZ						20	6.2	10	500M
1N5250B	S		1N5221	DZ						20	6.2	5.0	500M
1N5251	S		1N5221	DZ						22	5.6	10	500M
1N5251A	S		1N5221	DZ						22	5.6	10	500M
1N5251B	S		1N5221	DZ						22	5.6	5.0	500M
1N5252	S		1N5221	DZ						24	5.2	10	500M
1N5252A	S		1N5221	DZ						24	5.2	10	500M
1N5252B	S		1N5221	DZ						24	5.2	5.0	500M
1N5253	S		1N5221	DZ						25	5.0	10	500M
1N5253A	S		1N5221	DZ						25	5.0	10	500M
1N5253B	S		1N5221	DZ						25	5.0	5.0	500M
1N5254	S		1N5221	DZ						27	4.6	10	500M
1N5254A	S		1N5221	DZ						27	4.6	10	500M
1N5254B	S		1N5221	DZ						27	4.6	5.0	500M
1N5255	S		1N5221	DZ						28	4.5	10	500M
1N5255A	S		1N5221	DZ						28	4.5	10	500M
1N5255B	S		1N5221	DZ						28	4.5	5.0	500M
1N5256	S		1N5221	DZ						30	4.2	10	500M
1N5256A	S		1N5221	DZ						30	4.2	10	500M
1N5256B	S		1N5221	DZ						30	4.2	5.0	500M
1N5257	S		1N5221	DZ						33	3.8	10	500M
1N5257A	S		1N5221	DZ						33	3.8	10	500M
1N5257B	S		1N5221	DZ						33	3.8	5.0	500M
1N5258	S		1N5221	DZ						36	3.4	10	500M
1N5258A	S		1N5221	DZ						36	3.4	10	500M
1N5258B	S		1N5221	DZ						36	3.4	5.0	500M
1N5259	S		1N5221	DZ						39	3.2	10	500M
1N5259A	S		1N5221	DZ						39	3.2	10	500M
1N5259B	S		1N5221	DZ						39	3.2	5.0	500M
1N5260	S		1N5221	DZ						43	3.0	10	500M
1N5260A	S		1N5221	DZ						43	3.0	10	500M
1N5260B	S		1N5221	DZ						43	3.0	5.0	500M
1N5261	S		1N5221	DZ						47	2.7	10	500M
1N5261A	S		1N5221	DZ						47	2.7	10	500M
1N5261B	S		1N5221	DZ						47	2.7	5.0	500M



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5262	S		1N5221	DZ						51	2.5	10	500M
1N5262A	S		1N5221	DZ						51	2.5	10	500M
1N5262B	S		1N5221	DZ						51	2.5	5.0	500M
1N5263	S		1N5221	DZ						56	2.2	10	500M
1N5263A	S		1N5221	DZ						56	2.2	10	500M
1N5263B	S		1N5221	DZ						56	2.2	5.0	500M
1N5264	S		1N5221	DZ						60	2.1	10	500M
1N5264A	S		1N5221	DZ						60	2.1	10	500M
1N5264B	S		1N5221	DZ						60	2.1	5.0	500M
1N5265	S		1N5221	DZ						62	2.0	10	500M
1N5265A	S		1N5221	DZ						62	2.0	10	500M
1N5265B	S		1N5221	DZ						62	2.0	5.0	500M
1N5266	S		1N5221	DZ						68	1.8	10	500M
1N5266A	S		1N5221	DZ						68	1.8	10	500M
1N5266B	S		1N5221	DZ						68	1.8	5.0	500M
1N5267	S		1N5221	DZ						75	1.7	10	500M
1N5267A	S		1N5221	DZ						75	1.7	10	500M
1N5267B	S		1N5221	DZ						75	1.7	5.0	500M
1N5268	S		1N5221	DZ						82	1.5	10	500M
1N5268A	S		1N5221	DZ						82	1.5	10	500M
1N5268B	S		1N5221	DZ						82	1.5	5.0	500M
1N5269	S		1N5221	DZ						87	1.4	10	500M
1N5269A	S		1N5221	DZ						87	1.4	10	500M
1N5269B	S		1N5221	DZ						87	1.4	5.0	500M
1N5270	S		1N5221	DZ						91	1.4	10	500M
1N5270A	S		1N5221	DZ						91	1.4	10	500M
1N5270B	S		1N5221	DZ						91	1.4	5.0	500M
1N5271	S		1N5221	DZ						100	1.3	10	500M
1N5271A	S		1N5221	DZ						100	1.3	10	500M
1N5271B	S		1N5221	DZ						100	1.3	5.0	500M
1N5272	S		1N5221	DZ						110	1.1	10	500M
1N5272A	S		1N5221	DZ						110	1.1	10	500M
1N5272B	S		1N5221	DZ						110	1.1	5.0	500M
1N5273	S		1N5221	DZ						120	1.0	10	500M
1N5273A	S		1N5221	DZ						120	1.0	10	500M
1N5273B	S		1N5221	DZ						120	1.0	5.0	500M
1N5274	S		1N5221	DZ						130	0.95	10	500M
1N5274A	S		1N5221	DZ						130	0.95	10	500M
1N5274B	S		1N5221	DZ						130	0.95	5.0	500M
1N5275	S		1N5221	DZ						140	0.90	10	500M
1N5275A	S		1N5221	DZ						140	0.90	10	500M
1N5275B	S		1N5221	DZ						140	0.90	5.0	500M
1N5276	S		1N5221	DZ						150	0.85	10	500M
1N5276A	S		1N5221	DZ						150	0.85	10	500M
1N5276B	S		1N5221	DZ						150	0.85	5.0	500M
1N5277	S		1N5221	DZ						160	0.80	10	500M
1N5277A	S		1N5221	DZ						160	0.80	10	500M
1N5277B	S		1N5221	DZ						160	0.80	5.0	500M
1N5278	S		1N5221	DZ						170	0.74	10	500M
1N5278A	S		1N5221	DZ						170	0.74	10	500M
1N5278B	S		1N5221	DZ						170	0.74	5.0	500M
1N5279	S		1N5221	DZ						180	0.68	10	500M
1N5279A	S		1N5221	DZ						180	0.68	10	500M
1N5279B	S		1N5221	DZ						180	0.68	5.0	500M
1N5280	S		1N5221	DZ						190	0.66	10	500M
1N5280A	S		1N5221	DZ						190	0.66	10	500M
1N5280B	S		1N5221	DZ						190	0.66	5.0	500M
1N5281	S		1N5221	DZ						200	0.65	10	500M
1N5281A	S		1N5221	DZ						200	0.65	10	500M
1N5281B	S		1N5221	DZ						200	0.65	5.0	500M
1N5282	S			DS	55	1.3	500M	0.1*	0.004				
1N5283					Current Regulator Diodes, See Data Sheet								
thru													
1N5314	S			DS	75	0.49	0.1M	0.05*	0.004				
1N5315	S			DS	75	0.49	0.1M	0.05*	0.004				
1N5316	S			DS	55	1.17	500M	0.1*	0.004				
1N5317	S			DS	50	0.87	200M	0.1*	0.004				
1N5318	S			DS	25	1.0	100M	100*	0.004				
1N5319	S												
1N5320	S			R	100		1.0		20				
1N5324	S			R	15000	24	0.010	0.025	0.75				
1N5326	S			R	100		12		200				



**1N5329-1N5355A**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5329	S			R	100		0.135	0.150	10				
1N5330	S			R	100		0.540	0.150	15				
1N5331	S			R	1200		12		240				
1N5332	S			R	1200		35		500				
1N5333	S		1N5333	DZ						3.3	380	20	5.0
1N5333A	S		1N5333	DZ						3.3	380	10	5.0
1N5333B	S		1N5333	DZ						3.3	380	5	5.0
1N5334	S		1N5333	DZ						3.6	350	20	5.0
1N5334A	S		1N5333	DZ						3.6	350	10	5.0
1N5334B	S		1N5333	DZ						3.6	350	5	5.0
1N5335	S		1N5333	DZ						3.9	320	20	5.0
1N5335A	S		1N5333	DZ						3.9	320	10	5.0
1N5335B	S		1N5333	DZ						3.9	320	5	5.0
1N5336	S		1N5333	DZ						4.3	290	20	5.0
1N5336A	S		1N5333	DZ						4.3	290	10	5.0
1N5336B	S		1N5333	DZ						4.3	290	5	5.0
1N5337	S		1N5333	DZ						4.7	260	20	5.0
1N5337A	S		1N5333	DZ						4.7	260	10	5.0
1N5337B	S		1N5333	DZ						4.7	260	5	5.0
1N5338	S		1N5333	DZ						5.1	240	20	5.0
1N5338A	S		1N5333	DZ						5.1	240	10	5.0
1N5338B	S		1N5333	DZ						5.1	240	5	5.0
1N5339	S		1N5333	DZ						5.6	220	20	5.0
1N5339A	S		1N5333	DZ						5.6	220	10	5.0
1N5339B	S		1N5333	DZ						5.6	220	5	5.0
1N5340	S		1N5333	DZ						6.0	200	20	5.0
1N5340A	S		1N5333	DZ						6.0	200	10	5.0
1N5340B	S		1N5333	DZ						6.0	200	5	5.0
1N5341	S		1N5333	DZ						6.2	200	20	5.0
1N5341A	S		1N5333	DZ						6.2	200	10	5.0
1N5341B	S		1N5333	DZ						6.2	200	5	5.0
1N5342	S		1N5333	DZ						6.8	175	20	5.0
1N5342A	S		1N5333	DZ						6.8	175	10	5.0
1N5342B	S		1N5333	DZ						6.8	175	5	5.0
1N5343	S		1N5333	DZ						7.5	175	20	5.0
1N5343A	S		1N5333	DZ						7.5	175	10	5.0
1N5343B	S		1N5333	DZ						7.5	175	5	5.0
1N5344	S		1N5333	DZ						8.2	150	20	5.0
1N5344A	S		1N5333	DZ						8.2	150	10	5.0
1N5344B	S		1N5333	DZ						8.2	150	5	5.0
1N5345	S		1N5333	DZ						8.7	150	20	5.0
1N5345A	S		1N5333	DZ						8.7	150	10	5.0
1N5345B	S		1N5333	DZ						8.7	150	5	5.0
1N5346	S		1N5333	DZ						9.1	150	20	5.0
1N5346A	S		1N5333	DZ						9.1	150	10	5.0
1N5346B	S		1N5333	DZ						9.1	150	5	5.0
1N5347	S		1N5333	DZ						10	125	20	5.0
1N5347A	S		1N5333	DZ						10	125	10	5.0
1N5347B	S		1N5333	DZ						10	125	5	5.0
1N5348	S		1N5333	DZ						11	125	20	5.0
1N5348A	S		1N5333	DZ						11	125	10	5.0
1N5348B	S		1N5333	DZ						11	125	5	5.0
1N5349	S		1N5333	DZ						12	100	20	5.0
1N5349A	S		1N5333	DZ						12	100	10	5.0
1N5349B	S		1N5333	DZ						12	100	5	5.0
1N5350	S		1N5333	DZ						13	100	20	5.0
1N5350A	S		1N5333	DZ						13	100	10	5.0
1N5350B	S		1N5333	DZ						13	100	5	5.0
1N5351	S		1N5333	DZ						14	100	20	5.0
1N5351A	S		1N5333	DZ						14	100	10	5.0
1N5351B	S		1N5333	DZ						14	100	5	5.0
1N5352	S		1N5333	DZ						15	75	20	5.0
1N5352A	S		1N5333	DZ						15	75	10	5.0
1N5352B	S		1N5333	DZ						15	75	5	5.0
1N5353	S		1N5333	DZ						16	75	20	5.0
1N5353A	S		1N5333	DZ						16	75	10	5.0
1N5353B	S		1N5333	DZ						16	75	5	5.0
1N5354	S		1N5333	DZ						17	70	20	5.0
1N5354A	S		1N5333	DZ						17	70	10	5.0
1N5354B	S		1N5333	DZ						17	70	5	5.0
1N5355	S		1N5333	DZ						18	65	20	5.0
1N5355A	S		1N5333	DZ						18	65	10	5.0



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ (volts)	@ $I_F$	$I_R$	$t_{rr}$ ( $\mu s$ )	$V_Z$ (nom)	$T_C$ $^{\circ}C$	$I_{ZT}$ mA	Temp Range
1N5355B	S		1N5333	DZ						18	65	5	5.0
1N5356	S		1N5333	DZ						19	65	20	5.0
1N5356A	S		1N5333	DZ						19	65	10	5.0
1N5356B	S		1N5333	DZ						19	65	5	5.0
1N5357	S		1N5333	DZ						20	65	20	5.0
1N5357A	S		1N5333	DZ						20	65	10	5.0
1N5357B	S		1N5333	DZ						20	65	5	5.0
1N5358	S		1N5333	DZ						22	50	20	5.0
1N5358A	S		1N5333	DZ						22	50	10	5.0
1N5358B	S		1N5333	DZ						22	50	5	5.0
1N5359	S		1N5333	DZ						24	50	20	5.0
1N5359A	S		1N5333	DZ						24	50	10	5.0
1N5359B	S		1N5333	DZ						24	50	5	5.0
1N5360	S		1N5333	DZ						25	50	20	5.0
1N5360A	S		1N5333	DZ						25	50	10	5.0
1N5360B	S		1N5333	DZ						25	50	5	5.0
1N5361	S		1N5333	DZ						27	50	20	5.0
1N5361A	S		1N5333	DZ						27	50	10	5.0
1N5361B	S		1N5333	DZ						27	50	5	5.0
1N5362	S		1N5333	DZ						28	50	20	5.0
1N5362A	S		1N5333	DZ						28	50	10	5.0
1N5362B	S		1N5333	DZ						28	50	5	5.0
1N5363	S		1N5333	DZ						30	40	20	5.0
1N5363A	S		1N5333	DZ						30	40	10	5.0
1N5363B	S		1N5333	DZ						30	40	5	5.0
1N5364	S		1N5333	DZ						33	40	20	5.0
1N5364A	S		1N5333	DZ						33	40	10	5.0
1N5364B	S		1N5333	DZ						33	40	5	5.0
1N5365	S		1N5333	DZ						36	30	20	5.0
1N5365A	S		1N5333	DZ						36	30	10	5.0
1N5365B	S		1N5333	DZ						36	30	5	5.0
1N5366	S		1N5333	DZ						39	30	20	5.0
1N5366A	S		1N5333	DZ						39	30	10	5.0
1N5366B	S		1N5333	DZ						39	30	5	5.0
1N5367	S		1N5333	DZ						43	30	20	5.0
1N5367A	S		1N5333	DZ						43	30	10	5.0
1N5367B	S		1N5333	DZ						43	30	5	5.0
1N5368	S		1N5333	DZ						47	25	20	5.0
1N5368A	S		1N5333	DZ						47	25	10	5.0
1N5368B	S		1N5333	DZ						47	25	5	5.0
1N5369	S		1N5333	DZ						51	25	20	5.0
1N5369A	S		1N5333	DZ						51	25	10	5.0
1N5369B	S		1N5333	DZ						51	25	5	5.0
1N5370	S		1N5333	DZ						56	20	20	5.0
1N5370A	S		1N5333	DZ						56	20	10	5.0
1N5370B	S		1N5333	DZ						56	20	5	5.0
1N5371	S		1N5333	DZ						60	20	20	5.0
1N5371A	S		1N5333	DZ						60	20	10	5.0
1N5371B	S		1N5333	DZ						60	20	5	5.0
1N5372	S		1N5333	DZ						62	20	20	5.0
1N5372A	S		1N5333	DZ						62	20	10	5.0
1N5372B	S		1N5333	DZ						62	20	5	5.0
1N5373	S		1N5333	DZ						68	20	20	5.0
1N5373A	S		1N5333	DZ						68	20	10	5.0
1N5373B	S		1N5333	DZ						68	20	5	5.0
1N5374	S		1N5333	DZ						75	20	20	5.0
1N5374A	S		1N5333	DZ						75	20	10	5.0
1N5374B	S		1N5333	DZ						75	20	5	5.0
1N5375	S		1N5333	DZ						82	15	20	5.0
1N5375A	S		1N5333	DZ						82	15	10	5.0
1N5375B	S		1N5333	DZ						82	15	5	5.0
1N5376	S		1N5333	DZ						87	15	20	5.0
1N5376A	S		1N5333	DZ						87	15	10	5.0
1N5376B	S		1N5333	DZ						87	15	5	5.0
1N5377	S		1N5333	DZ						91	15	20	5.0
1N5377A	S		1N5333	DZ						91	15	10	5.0
1N5377B	S		1N5333	DZ						91	15	5	5.0
1N5378	S		1N5333	DZ						100	12	20	5.0
1N5378A	S		1N5333	DZ						100	12	10	5.0
1N5378B	S		1N5333	DZ						100	12	5	5.0
1N5379	S		1N5333	DZ						110	12	20	5.0
1N5379A	S		1N5333	DZ						110	12	10	5.0
1N5379B	S		1N5333	DZ						110	12	5	5.0
1N5380	S		1N5333	DZ						120	10	20	5.0
1N5380A	S		1N5333	DZ						120	10	10	5.0
1N5380B	S		1N5333	DZ						120	10	5	5.0
1N5381	S		1N5333	DZ						130	10	20	5.0
1N5381A	S		1N5333	DZ						130	10	10	5.0
1N5381B	S		1N5333	DZ						130	10	5	5.0
1N5382	S		1N5333	DZ						140	8.0	20	5.0
1N5382A	S		1N5333	DZ						140	8.0	10	5.0
1N5382B	S		1N5333	DZ						140	8.0	5	5.0



**1N5383-1N5432**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5383	S		1N5333	DZ						150	8.0	20	5.0
1N5383A	S		1N5333	DZ						150	8.0	10	5.0
1N5383B	S		1N5333	DZ						150	8.0	5	5.0
1N5384	S		1N5333	DZ						160	8.0	20	5.0
1N5384A	S		1N5333	DZ						160	8.0	10	5.0
1N5384B	S		1N5333	DZ						160	8.0	5	5.0
1N5385	S		1N5333	DZ						170	8.0	20	5.0
1N5385A	S		1N5333	DZ						170	8.0	10	5.0
1N5385B	S		1N5333	DZ						170	8.0	5	5.0
1N5386	S		1N5333	DZ						180	5.0	20	5.0
1N5386A	S		1N5333	DZ						180	5.0	10	5.0
1N5386B	S		1N5333	DZ						180	5.0	5	5.0
1N5387	S		1N5333	DZ						190	5.0	20	5.0
1N5387A	S		1N5333	DZ						190	5.0	10	5.0
1N5387B	S		1N5333	DZ						190	5.0	5	5.0
1N5388	S		1N5333	DZ						200	5.0	20	5.0
1N5388A	S		1N5333	DZ						200	5.0	10	5.0
1N5388B	S		1N5333	DZ						200	5.0	5	5.0
1N5389	S	Hot Carrier Diode	R		40,000	80	0.100	0.10	10				
1N5390	S		R		50		1.5		50				
1N5391	S		R		100		1.5		50				
1N5392	S		R		200		1.5		50				
1N5393	S		R		300		1.5		50				
1N5394	S		R										
1N5395	S		R		400		1.5		50				
1N5396	S		R		500		1.5		50				
1N5397	S		R		600		1.5		50				
1N5398	S		R		800		1.5		50				
1N5399	S		R		1000		1.5		50				
1N5400	S		R		50		3.0		200				
1N5401	S		R		100		3.0		200				
1N5402	S		R		200		3.0		200				
1N5403	S		R		300		3.0		200				
1N5404	S		R		400		3.0		200				
1N5405	S		R		500		3.0		200				
1N5406	S		R		600		3.0		200				
1N5407	S	Diac (Trigger Diode)	R		800		3.0		200				
1N5408	S		R		1000		3.0		200				
1N5409	S		R		175		40		1000				
1N5410	S		R		175		12		200				
1N5411	S		DS		30	0.500	0.1M	100N	0.002				
1N5412	S		DS		55	0.500	0.1M	100N	0.002				
1N5413	S		DS		75	0.500	0.1M	100N	0.002				
1N5414	S		R		50				200				
1N5415	S		R		100				200				
1N5416	S		R		200				200				
1N5417	S	Varactor Diodes, see Table on Page 1-100	R		400				200				
1N5418	S		R		500				200				
1N5419	S		R		600				200				
1N5420	S		DS										
1N5421	S		DS										
1N5422	S		DS										
1N5423	S		DS										
1N5424	S		DS										
1N5425	S		DS										
1N5426	S		DS										
1N5427	S		DS										
1N5428	S		DS										
1N5429	S		DS										
1N5430	S		DS										
1N5431	S		DS										
1N5432	S		DS										



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5433	S	Microwave Mixers		R	600		2.0		25				
1N5434	S			R	600		2.0		60				
1N5435	S			R	600		12		200				
1N5436													
1N5437													
1N5438													
1N5439													
thru		Varactor Diodes, see Table on Page 1-100											
1N5476													
1N5477	S			R	6000		0.6	0.350	80				
1N5478	S			R	7200		0.6	0.350	80				
1N5479	S			R	8400		0.6	0.350	80				
1N5480	S			R	9600		0.6	0.350	80				
1N5481	S			R	12000		0.6	0.350	80				
1N5482	S			R	2400		1.0	0.350	80				
1N5483	S			R	3600		1.0	0.350	80				
1N5484	S			R	4800		1.0	0.350	80				
1N5485	S			R	6000		1.0	0.350	80				
1N5518	S		1N5518	DZ						3.3	20	20	400M
1N5518A	S		1N5518	DZ						3.3	20	10	400M
1N5518B	S		1N5518	DZ						3.3	20	5.0	400M
1N5518C	S		1N5518	DZ						3.3	20	2.0	400M
1N5518D	S			DZ						3.3	20	1.0	400M
1N5519	S		1N5518	DZ						3.6	20	20	400M
1N5519A	S		1N5518	DZ						3.6	20	10	400M
1N5519B	S		1N5518	DZ						3.6	20	5.0	400M
1N5519C	S			DZ						3.6	20	2.0	400M
1N5519D	S			DZ						3.6	20	1.0	400M
1N5520	S		1N5518	DZ						3.9	20	20	400M
1N5520A	S		1N5518	DZ						3.9	20	10	400M
1N5520B	S		1N5518	DZ						3.9	20	5.0	400M
1N5520C	S			DZ						3.9	20	2.0	400M
1N5520D	S			DZ						3.9	20	1.0	400M
1N5521	S		1N5518	DZ						4.3	20	20	400M
1N5521A	S		1N5518	DZ						4.3	20	10	400M
1N5521B	S		1N5518	DZ						4.3	20	5.0	400M
1N5521C	S			DZ						4.3	20	2.0	400M
1N5521D	S			DZ						4.3	20	1.0	400M
1N5522	S		1N5518	DZ						4.7	10	20	400M
1N5522A	S		1N5518	DZ						4.7	10	10	400M
1N5522B	S		1N5518	DZ						4.7	10	5.0	400M
1N5522C	S			DZ						4.7	10	2.0	400M
1N5522D	S			DZ						4.7	10	1.0	400M
1N5523	S		1N5518	DZ						5.1	5.0	20	400M
1N5523A	S		1N5518	DZ						5.1	5.0	10	400M
1N5523B	S		1N5518	DZ						5.1	5.0	5.0	400M
1N5523C	S			DZ						5.1	5.0	2.0	400M
1N5523D	S			DZ						5.1	5.0	1.0	400M
1N5524	S		1N5518	DZ						5.6	3.0	20	400M
1N5524A	S		1N5518	DZ						5.6	3.0	10	400M
1N5524B	S		1N5518	DZ						5.6	3.0	5.0	400M
1N5524C	S			DZ						5.6	3.0	2.0	400M
1N5524D	S			DZ						5.6	3.0	1.0	400M
1N5525	S		1N5518	DZ						6.2	1.0	20	400M
1N5525A	S		1N5518	DZ						6.2	1.0	10	400M
1N5525B	S		1N5518	DZ						6.2	1.0	5.0	400M
1N5525C	S			DZ						6.2	1.0	2.0	400M
1N5525D	S			DZ						6.2	1.0	1.0	400M
1N5526	S		1N5518	DZ						6.8	1.0	20	400M
1N5526A	S		1N5518	DZ						6.8	1.0	10	400M
1N5526B	S		1N5518	DZ						6.8	1.0	5.0	400M
1N5526C	S			DZ						6.8	1.0	2.0	400M
1N5526D	S			DZ						6.8	1.0	1.0	400M
1N5527	S		1N5518	DZ						7.5	1.0	20	400M
1N5527A	S		1N5518	DZ						7.5	1.0	10	400M
1N5527B	S		1N5518	DZ						7.5	1.0	5.0	400M
1N5527C	S			DZ						7.5	1.0	2.0	400M
1N5527D	S			DZ						7.5	1.0	1.0	400M
1N5528	S		1N5518	DZ						8.2	1.0	20	400M
1N5528A	S		1N5518	DZ						8.2	1.0	10	400M
1N5528B	S		1N5518	DZ						8.2	1.0	5.0	400M
1N5528C	S			DZ						8.2	1.0	2.0	400M
1N5528D	S			DZ						8.2	1.0	1.0	400M
1N5529	S		1N5518	DZ						9.1	1.0	20	400M
1N5529A	S		1N5518	DZ						9.1	1.0	10	400M
1N5529B	S		1N5518	DZ						9.1	1.0	5.0	400M



**1N5529C-1N5544B**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)		I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5529C	S			DZ						9.1	1.0	2.0	400M
1N5529D	S			DZ						9.1	1.0	1.0	400M
1N5530	S		1N5518	DZ						10	1.0	20	400M
1N5530A	S		1N5518	DZ						10	1.0	10	400M
1N5530B	S		1N5518	DZ						10	1.0	5.0	400M
1N5530C	S			DZ						10	1.0	2.0	400M
1N5530D	S			DZ						10	1.0	1.0	400M
1N5531	S		1N5518	DZ						11	1.0	20	400M
1N5531A	S		1N5518	DZ						11	1.0	10	400M
1N5531B	S		1N5518	DZ						11	1.0	5.0	400M
1N5531C	S			DZ						11	1.0	2.0	400M
1N5531D	S			DZ						11	1.0	1.0	400M
1N5532	S		1N5518	DZ						12	1.0	20	400M
1N5532A	S		1N5518	DZ						12	1.0	10	400M
1N5532B	S		1N5518	DZ						12	1.0	5.0	400M
1N5532C	S			DZ						12	1.0	2.0	400M
1N5532D	S			DZ						12	1.0	1.0	400M
1N5533	S		1N5518	DZ						13	1.0	20	400M
1N5533A	S		1N5518	DZ						13	1.0	10	400M
1N5533B	S		1N5518	DZ						13	1.0	5.0	400M
1N5533C	S			DZ						13	1.0	2.0	400M
1N5533D	S			DZ						13	1.0	1.0	400M
1N5534	S		1N5518	DZ						14	1.0	20	400M
1N5534A	S		1N5518	DZ						14	1.0	10	400M
1N5534B	S		1N5518	DZ						14	1.0	5.0	400M
1N5534C	S			DZ						14	1.0	2.0	400M
1N5534D	S			DZ						14	1.0	1.0	400M
1N5535	S		1N5518	DZ						15	1.0	20	400M
1N5535A	S		1N5518	DZ						15	1.0	10	400M
1N5535B	S		1N5518	DZ						15	1.0	5.0	400M
1N5535C	S			DZ						15	1.0	2.0	400M
1N5535D	S			DZ						15	1.0	1.0	400M
1N5536	S		1N5518	DZ						16	1.0	20	400M
1N5536A	S		1N5518	DZ						16	1.0	10	400M
1N5536B	S		1N5518	DZ						16	1.0	5.0	400M
1N5536C	S			DZ						16	1.0	2.0	400M
1N5536D	S			DZ						16	1.0	1.0	400M
1N5537	S		1N5518	DZ						17	1.0	20	400M
1N5537A	S		1N5518	DZ						17	1.0	10	400M
1N5537B	S		1N5518	DZ						17	1.0	5.0	400M
1N5537C	S			DZ						17	1.0	2.0	400M
1N5537D	S			DZ						17	1.0	1.0	400M
1N5538	S		1N5518	DZ						18	1.0	20	400M
1N5538A	S		1N5518	DZ						18	1.0	10	400M
1N5538B	S		1N5518	DZ						18	1.0	5.0	400M
1N5538C	S			DZ						18	1.0	2.0	400M
1N5538D	S			DZ						18	1.0	1.0	400M
1N5539	S		1N5518	DZ						19	1.0	20	400M
1N5539A	S		1N5518	DZ						19	1.0	10	400M
1N5539B	S		1N5518	DZ						19	1.0	5.0	400M
1N5539C	S			DZ						19	1.0	2.0	400M
1N5539D	S			DZ						19	1.0	1.0	400M
1N5540	S		1N5518	DZ						20	1.0	20	400M
1N5540A	S		1N5518	DZ						20	1.0	10	400M
1N5540B	S		1N5518	DZ						20	1.0	5.0	400M
1N5540C	S			DZ						20	1.0	2.0	400M
1N5540D	S			DZ						20	1.0	1.0	400M
1N5541	S		1N5518	DZ						22	1.0	20	400M
1N5541A	S		1N5518	DZ						22	1.0	10	400M
1N5541B	S		1N5518	DZ						22	1.0	5.0	400M
1N5541C	S			DZ						22	1.0	2.0	400M
1N5541D	S			DZ						22	1.0	1.0	400M
1N5542	S		1N5518	DZ						24	1.0	20	400M
1N5542A	S		1N5518	DZ						24	1.0	10	400M
1N5542B	S		1N5518	DZ						24	1.0	5.0	400M
1N5542C	S			DZ						24	1.0	2.0	400M
1N5542D	S			DZ						24	1.0	1.0	400M
1N5543	S		1N5518	DZ						25	1.0	20	400M
1N5543A	S		1N5518	DZ						25	1.0	10	400M
1N5543B	S		1N5518	DZ						25	1.0	5.0	400M
1N5543C	S			DZ						25	1.0	2.0	400M
1N5543D	S			DZ						25	1.0	1.0	400M
1N5544	S		1N5518	DZ						28	1.0	20	400M
1N5544A	S		1N5518	DZ						28	1.0	10	400M
1N5544B	S		1N5518	DZ						28	1.0	5.0	400M



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					$V_R$ (volts)	$V_F$ (volts)	$I_O$ (Amps)	$I_R$ (mA)	$I_{FSM}$ (Amps)	$V_Z$ (nom)	$I_{ZT}$ mA	Tol $V_{Z\pm\%}$	$P_D$
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	$V_F$ (volts)	$I_F$	$I_R$	$t_{rr}$ ( $\mu s$ )	$V_Z$ (nom)	$T_C$ °C	$I_{ZT}$ mA	Temp Range
1N5544C	S			DZ						28	1.0	2.0	400M
1N5544D	S			DZ						28	1.0	1.0	400M
1N5545	S		1N5518	DZ						30	1.0	20	400M
1N5545A	S		1N5518	DZ						30	1.0	10	400M
1N5545B	S		1N5518	DZ						30	1.0	5.0	400M
1N5545C	S			DZ						30	1.0	2.0	400M
1N5545D	S			DZ						30	1.0	1.0	400M
1N5546	S		1N5518	DZ						33	1.0	20	400M
1N5546A	S		1N5518	DZ						33	1.0	10	400M
1N5546B	S		1N5518	DZ						33	1.0	5.0	400M
1N5546C	S			DZ						33	1.0	2.0	400M
1N5546D	S			DZ						33	1.0	1.0	400M
1N5550	S			R	200	1.0	3.0	0.025	150				
1N5551	S			R	400	1.0	3.0	0.025	150				
1N5552	S			R	600	1.0	3.0	0.025	150				
1N5553	S			R	800	1.1	3.0	0.025	150				
1N5554	S			R	1000	1.1	3.0	0.025	150				
1N5555	thru Transient Suppressors, see Table on Page 1-98												
1N5558	S			DZ						6.8	37	20	1.0W
1N5559	S			DZ						6.8	37	10	1.0W
1N5559A	S			DZ						6.8	37	5.0	1.0W
1N5559B	S			DZ						7.5	34	20	1.0W
1N5560	S			DZ						7.5	34	10	1.0W
1N5560B	S			DZ						7.5	34	5.0	1.0W
1N5561	S			DZ						8.2	31	20	1.0W
1N5561A	S			DZ						8.2	31	10	1.0W
1N5561B	S			DZ						8.2	31	5.0	1.0W
1N5562	S			DZ						9.1	28	20	1.0W
1N5562A	S			DZ						9.1	28	10	1.0W
1N5562B	S			DZ						9.1	28	5.0	1.0W
1N5563	S			DZ						10	25	20	1.0W
1N5563A	S			DZ						10	25	10	1.0W
1N5563B	S			DZ						10	25	5.0	1.0W
1N5564	S			DZ						11	23	20	1.0W
1N5564A	S			DZ						11	23	10	1.0W
1N5564B	S			DZ						11	23	5.0	1.0W
1N5565	S			DZ						12	21	20	1.0W
1N5565A	S			DZ						12	21	10	1.0W
1N5565B	S			DZ						12	21	5.0	1.0W
1N5566	S			DZ						13	19	20	1.0W
1N5566A	S			DZ						13	19	10	1.0W
1N5566B	S			DZ						13	19	5.0	1.0W
1N5567	S			DZ						15	17	20	1.0W
1N5567A	S			DZ						15	17	10	1.0W
1N5567B	S			DZ						15	17	5.0	1.0W
1N5568	S			DZ						16	15	20	1.0W
1N5568A	S			DZ						16	15	10	1.0W
1N5568B	S			DZ						16	15	5.0	1.0W
1N5569	S			DZ						18	14	20	1.0W
1N5569A	S			DZ						18	14	10	1.0W
1N5569B	S			DZ						18	14	5.0	1.0W
1N5570	S			DZ						20	12	20	1.0W
1N5570A	S			DZ						20	12	10	1.0W
1N5570B	S			DZ						20	12	5.0	1.0W
1N5571	S			DZ						22	11	20	1.0W
1N5571A	S			DZ						22	11	10	1.0W
1N5571B	S			DZ						22	11	5.0	1.0W
1N5572	S			DZ						24	10	20	1.0W
1N5572A	S			DZ						24	10	10	1.0W
1N5572B	S			DZ						24	10	5.0	1.0W
1N5573	S			DZ						27	9.5	20	1.0W
1N5573A	S			DZ						27	9.5	10	1.0W
1N5573B	S			DZ						27	9.5	5.0	1.0W
1N5574	S			DZ						30	8.5	20	1.0W
1N5574A	S			DZ						30	8.5	10	1.0W
1N5574B	S			DZ						30	8.5	5.0	1.0W
1N5575	S			DZ						33	7.5	20	1.0W
1N5575A	S			DZ						33	7.5	10	1.0W
1N5575B	S			DZ						33	7.5	5.0	1.0W
1N5576	S			DZ						36	7.0	20	1.0W
1N5576A	S			DZ						36	7.0	10	1.0W
1N5576B	S			DZ						36	7.0	5.0	1.0W
1N5577	S			DZ						39	6.5	20	1.0W
1N5577A	S			DZ						39	6.5	10	1.0W
1N5577B	S			DZ						39	6.5	5.0	1.0W
1N5578	S			DZ						43	6.0	20	1.0W



**1N5578A-1N5623**

TYPE	MATERIAL	REPLACEMENT	PAGE NUMBER	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub> (Amps)	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> °C	I <sub>ZT</sub> mA	Temp Range
1N5578A	S			DZ						43	6.0	10	1.0W
1N5578B	S			DZ						43	6.0	5.0	1.0W
1N5579	S			DZ						47	5.5	20	1.0W
1N5579A	S			DZ						47	5.5	10	1.0W
1N5579B	S			DZ						47	5.5	5.0	1.0W
1N5580	S			DZ						51	5.0	20	1.0W
1N5580A	S			DZ						51	5.0	10	1.0W
1N5580B	S			DZ						51	5.0	5.0	1.0W
1N5581	S			DZ						56	4.5	20	1.0W
1N5581A	S			DZ						56	4.5	10	1.0W
1N5581B	S			DZ						56	4.5	5.0	1.0W
1N5582	S			DZ						62	4.0	20	1.0W
1N5582A	S			DZ						62	4.0	10	1.0W
1N5582B	S			DZ						62	4.0	5.0	1.0W
1N5583	S			DZ						68	3.7	20	1.0W
1N5583A	S			DZ						68	3.7	10	1.0W
1N5583B	S			DZ						68	3.7	5.0	1.0W
1N5584	S			DZ						75	3.3	20	1.0W
1N5584A	S			DZ						75	3.3	10	1.0W
1N5584B	S			DZ						75	3.3	5.0	1.0W
1N5585	S			DZ						82	3.0	20	1.0W
1N5585A	S			DZ						82	3.0	10	1.0W
1N5585B	S			DZ						82	3.0	5.0	1.0W
1N5586	S			DZ						91	2.8	20	1.0W
1N5586A	S			DZ						91	2.8	10	1.0W
1N5586B	S			DZ						91	2.8	5.0	1.0W
1N5587	S			DZ						100	2.5	20	1.0W
1N5587A	S			DZ						100	2.5	10	1.0W
1N5587B	S			DZ						100	2.5	5.0	1.0W
1N5588	S			DZ						110	2.3	20	1.0W
1N5588A	S			DZ						110	2.3	10	1.0W
1N5588B	S			DZ						110	2.3	5.0	1.0W
1N5589	S			DZ						120	2.0	20	1.0W
1N5589A	S			DZ						120	2.0	10	1.0W
1N5589B	S			DZ						120	2.0	5.0	1.0W
1N5590	S			DZ						130	1.9	20	1.0W
1N5590A	S			DZ						130	1.9	10	1.0W
1N5590B	S			DZ						130	1.9	5.0	1.0W
1N5591	S			DZ						130	1.9	20	1.0W
1N5591A	S			DZ						150	1.7	10	1.0W
1N5591B	S			DZ						150	1.7	5.0	1.0W
1N5592	S			DZ						150	1.7	20	1.0W
1N5592A	S			DZ						160	1.6	10	1.0W
1N5592B	S			DZ						160	1.6	5.0	1.0W
1N5593	S			DZ						180	1.4	20	1.0W
1N5593A	S			DZ						180	1.4	10	1.0W
1N5593B	S			DZ						180	1.4	5.0	1.0W
1N5594	S			DZ						200	1.2	20	1.0W
1N5594A	S			DZ						200	1.2	10	1.0W
1N5594B	S			DZ						200	1.2	5.0	1.0W
1N5595	S			R	5000	7.4	1.15	0.30	30	200	1.2		
1N5596	S			R	7500	11	0.87	0.30	30				
1N5597	S			R	10,000	14.5	0.70	0.30	30				
1N5598	S			R	15,000	23	0.47	0.30	30				
1N5599	S			R	2500	3.7	2.1	0.75	100				
1N5600	S			R	5000	7.4	1.4	0.75	100				
1N5601	S			R	7500	11	0.92	0.75	100				
1N5602	S			R	2500	5.0	4.6	1.0	200				
1N5603	S			R	5000	9.0	3.5	1.0	200				
1N5604	S			R	7500	12	2.3	1.0	200				
1N5605	S			DS	70	1.0	20M	25N					
1N5606	S			DS	150	1.0	7.0M	25N					
1N5607	S			DS	200	1.0	3.0M	25N					
1N5608	S			DS	120	1.0	100M	50N					
1N5609	S			DS	120	1.0	6.0M	5.0*					
1N5610 thru 1N5613				Transient Suppressors, See Table on Page 1-98									
1N5614	S			R	200	1.2	1.0	0.0025	50				
1N5615	S			R	200	1.2	1.0	0.0025	50				
1N5616	S			R	400	1.2	1.0	0.0025	50				
1N5617	S			R	400	1.2	1.0	0.0025	50				
1N5618	S			R	600	1.2	1.0	0.0025	50				
1N5619	S			R	600	1.2	1.0	0.0025	50				
1N5620	S			R	600	1.2	1.0	0.0025	50				
1N5621	S			R	800	1.2	1.0	0.0025	50				
1N5622	S			R	800	1.2	1.0	0.0025	50				
1N5623	S			R	1000	1.2	1.0	0.0025	50				



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub>	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts)	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5624	S			R	200	0.95	3.0	0.3	125				
1N5625	S			R	400	0.95	3.0	0.3	125				
1N5626	S			R	600	0.95	3.0	0.3	125				
1N5627	S			R	800	0.95	3.0	0.3	125				
1N5629,A thru 1N5665,A	Transient Suppressors, see Table on Page 1-98												
1N5666A	S			DZ						1.8	1.0	10	250M
1N5667A	S			DZ						2.0	1.0	10	250M
1N5668A	S			DZ						2.2	1.0	10	250M
1N5669A	S			DZ						2.4	1.0	10	250M
155670A	S			DZ						2.7	1.0	10	250M
1N5671A	S			DZ						3.0	1.0	10	250M
1N5672A	S			DZ						3.3	1.0	10	250M
1N5673A	S			DZ						3.6	1.0	10	250M
1N5674A	S			DZ						3.9	1.0	10	250M
1N5675A	S			DZ						4.3	1.0	10	250M
1N5676A	S			DZ						4.7	1.0	10	250M
1N5677A	S			DZ						5.1	1.0	10	250M
1N5678A	S			DZ						5.6	1.0	10	250M
1N5679	S			R	50	1.1	1.0	0.01	50				
1N5680	S			R	100	1.1	1.0	0.01	50				
1N5711 thru 1N5713	Hot Carrier Diodes												
1N5720	S			DS	30	1.0	50M	500N	0.01				
1N5721	S			DS	15	1.0	50M	500N	0.01				
1N5726	S			DS	60	1.1	500M	200N	0.01				
1N5727	S			DS	50	1.1	500M	100N	0.01				
1N5728B	S			DZ						4.7	10	5.0	400M
1N5729B	S			DZ						5.1	10	5.0	400M
1N5730B	S			DZ						5.6	10	5.0	400M
1N5731B	S			DZ						6.2	10	5.0	400M
1N5732B	S			DZ						6.8	10	5.0	400M
1N5733B	S			DZ						7.5	10	5.0	400M
1N5734B	S			DZ						8.2	10	5.0	400M
1N5735B	S			DZ						9.1	10	5.0	400M
1N5736B	S			DZ						10	10	5.0	400M
1N5737B	S			DZ						11	5.0	5.0	400M
1N5738B	S			DZ						12	5.0	5.0	400M
1N5739B	S			DZ						13	5.0	5.0	400M
1N5740B	S			DZ						15	5.0	5.0	400M
1N5741B	S			DZ						16	5.0	5.0	400M
1N5742B	S			DZ						18	5.0	5.0	400M
1N5743B	S			DZ						20	5.0	5.0	400M
1N5744B	S			DZ						22	5.0	5.0	400M
1N5745B	S			DZ						24	5.0	5.0	400M
1N5746B	S			DZ						27	2.0	5.0	400M
1N5747B	S			DZ						30	2.0	5.0	400M
1N5748B	S			DZ						33	2.0	5.0	400M
1N5749B	S			DZ						36	2.0	5.0	400M
1N5750B	S			DZ						39	2.0	5.0	400M
1N5751B	S			DZ						43	2.0	5.0	400M
1N5752B	S			DZ						47	2.0	5.0	400M
1N5753B	S			DZ						51	2.0	5.0	400M
1N5754B	S			DZ						56	2.0	5.0	400M
1N5755B	S			DZ						62	2.0	5.0	400M
1N5756B	S			DZ						68	2.0	5.0	400M
1N5757B	S			DZ						75	2.0	5.0	400M
1N5763	S			R	33	1.2	300	10	4500				
1N5764	Microwave Mixer, Diode: to 17 GHz; NF = 7.0 dB												
1N5765	Light-Emitting Diode												
1N5766	S			DS	110	1.75	30	2.0*	400 N				
1N5767	S			DS		1.0	100M	1.0*					
1N5779 thru 1N5793	4 Layer Diode, See Table on Page 1-96												
1N5794	S			R	50	1.0		30					
1N5795	S			R	100	1.0		30					
1N5796	S			R	200	1.0		30					
1N5797	S			R	400	1.0		30					
1N5798	S			R	600	1.0		30					
1N5799	S			R	800	1.0		30					
1N5800	S			R	1000	1.0		30					
1N5801	Light-Emitting Diode												
1N5802	S	MR850	MR850	R	50	0.8	2.5	2.0	35				
1N5803	S	MR851	MR850	R	75	0.8	2.5	2.0	35				
1N5804	S	MR851	MR850	R	100	0.8	2.5	2.0	35				
1N5805	S	MR852	MR850	R	125	0.8	2.5	2.0	35				
1N5806	S	MR852	MR850	R	150	0.8	2.5	2.0	35				
1N5807	S	MR850	MR820	R	50	0.7	6.0	3.0	125				
1N5808	S	MR821	MR820	R	75	0.7	6.0	3.0	125				
1N5809	S	MR821	MR820	R	100	0.7	6.0	3.0	125				
1N5810	S	MR822	MR820	R	125	0.7	6.0	3.0	125				
1N5811	S	MR822	MR820	R	150	0.7	6.0	3.0	125				
1N5812	S	1N3899	1N3899	R	50	0.85	20	10	250				
1N5813	S	1N3900	1N3899	R	75	0.85	20	10	250				
1N5814	S	1N3900	1N3899	R	100	0.85	20	10	250				
1N5815	S	1N3901	1N3899	R	125	0.85	20	10	250				
1N5816	S	1N3901	1N3899	R	150	0.85	20	10	250				



**IN5823-IN5873B**

TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub>	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ (volts) I <sub>F</sub>		I <sub>R</sub>	t <sub>rr</sub> (μs)	V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
IN5823	S			R	20		15	10	500				
IN5824	S			R	30		15	10	500				
IN5825	S			R	40		15	10	500				
IN5826	S			R	20		15	10	500				
IN5827	S			R	30		15	10	500				
IN5828	S			R	40		15	10	500				
IN5829	S			R	20		25	20	800				
IN5830	S			R	30		25	20	800				
IN5831	S			R	40		25	20	800				
IN5832	S			R	20		40	20	800				
IN5833	S			R	30		40	20	800				
IN5834	S			R	40		40	20	800				
IN5837A	S			DZ						2.4	20	10	500M
IN5837B	S			DZ						2.4	20	5.0	500M
IN5838A	S			DZ						2.5	20	10	500M
IN5838B	S			DZ						2.5	20	5.0	500M
IN5839A	S			DZ						2.7	20	10	500M
IN5839B	S			DZ						2.7	20	5.0	500M
IN5840A	S			DZ						2.8	20	10	500M
IN5840B	S			DZ						2.8	20	5.0	500M
IN5841A	S			DZ						3.0	20	10	500M
IN5841B	S			DZ						3.0	20	5.0	500M
IN5842A	S			DZ						3.3	20	10	500M
IN5842B	S			DZ						3.3	20	5.0	500M
IN5843A	S			DZ						3.6	20	10	500M
IN5843B	S			DZ						3.6	20	5.0	500M
IN5844A	S			DZ						3.9	20	10	500M
IN5844B	S			DZ						3.9	20	5.0	500M
IN5845A	S			DZ						4.3	20	10	500M
IN5845B	S			DZ						4.3	20	5.0	500M
IN5846A	S			DZ						4.7	20	10	500M
IN5846B	S			DZ						4.7	20	5.0	500M
IN5847A	S			DZ						5.1	20	10	500M
IN5847B	S			DZ						5.1	20	5.0	500M
IN5848A	S			DZ						5.6	20	10	500M
IN5848B	S			DZ						5.6	20	5.0	500M
IN5849A	S			DZ						6.0	20	10	500M
IN5849B	S			DZ						6.0	20	5.0	500M
IN5850A	S			DZ						6.2	20	10	500M
IN5850B	S			DZ						6.2	20	5.0	500M
IN5851A	S			DZ						6.8	20	10	500M
IN5851B	S			DZ						6.8	20	5.0	500M
IN5852A	S			DZ						7.5	20	10	500M
IN5852B	S			DZ						7.5	20	5.0	500M
IN5853A	S			DZ						8.2	20	10	500M
IN5853B	S			DZ						8.2	20	5.0	500M
IN5854A	S			DZ						8.7	20	10	500M
IN5854B	S			DZ						8.7	20	5.0	500M
IN5855A	S			DZ						9.1	20	10	500M
IN5855B	S			DZ						9.1	20	5.0	500M
IN5856A	S			DZ						10	20	10	500M
IN5856B	S			DZ						10	20	5.0	500M
IN5857A	S			DZ						11	20	10	500M
IN5857B	S			DZ						11	20	5.0	500M
IN5858A	S			DZ						12	20	10	500M
IN5858B	S			DZ						12	20	5.0	500M
IN5859A	S			DZ						13	9.5	10	500M
IN5859B	S			DZ						13	9.5	5.0	500M
IN5860A	S			DZ						14	9.0	10	500M
IN5860B	S			DZ						14	9.0	5.0	500M
IN5861A	S			DZ						15	8.5	10	500M
IN5861B	S			DZ						15	8.5	5.0	500M
IN5862A	S			DZ						16	7.8	10	500M
IN5862B	S			DZ						16	7.8	5.0	500M
IN5863A	S			DZ						17	7.4	10	500M
IN5863B	S			DZ						17	7.4	5.0	500M
IN5864A	S			DZ						18	7.0	10	500M
IN5864B	S			DZ						18	7.0	5.0	500M
IN5865A	S			DZ						19	6.6	10	500M
IN5865B	S			DZ						19	6.6	5.0	500M
IN5866A	S			DZ						20	6.2	10	500M
IN5866B	S			DZ						20	6.2	5.0	500M
IN5867A	S			DZ						22	5.6	10	500M
IN5867B	S			DZ						22	5.6	5.0	500M
IN5868A	S			DZ						24	5.2	10	500M
IN5868B	S			DZ						24	5.2	5.0	500M
IN5869A	S			DZ						25	5.0	10	500M
IN5869B	S			DZ						25	5.0	5.0	500M
IN5870A	S			DZ						27	4.6	10	500M
IN5870B	S			DZ						27	4.6	5.0	500M
IN5871A	S			DZ						28	4.5	10	500M
IN5871B	S			DZ						28	4.5	5.0	500M
IN5872A	S			DZ						30	4.2	10	500M
IN5872B	S			DZ						30	4.2	5.0	500M
IN5873A	S			DZ						33	3.8	10	500M
IN5873B	S			DZ						33	3.8	5.0	500M



TYPE	MATERIAL	REPLACEMENT	REF.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
					V <sub>R</sub> (volts)	V <sub>F</sub> (volts)	I <sub>O</sub> (Amps)	I <sub>R</sub> (mA)	I <sub>FSM</sub>	V <sub>Z</sub> (nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
					SIGNAL DIODES					REFERENCE DIODES			
					PRV (volts)	V <sub>F</sub> @ I <sub>F</sub> (volts)	I <sub>R</sub>	t <sub>rr</sub> (μs)		V <sub>Z</sub> (nom)	T <sub>C</sub> %/°C	I <sub>ZT</sub> mA	Temp Range
1N5874A	S			DZ						36	3.4	10	500M
1N5874B	S			DZ						36	3.4	5.0	500M
1N5875A	S			DZ						39	3.2	10	500M
1N5875B	S			DZ						39	3.2	5.0	500M
1N5876A	S			DZ						43	3.0	10	500M
1N5876B	S			DZ						43	3.0	5.0	500M
1N5877A	S			DZ						47	2.7	10	500M
1N5877B	S			DZ						47	2.7	5.0	500M
1N5878A	S			DZ						51	2.5	10	500M
1N5878B	S			DZ						51	2.5	5.0	500M
1N5879A	S			DZ						56	2.2	10	500M
1N5879B	S			DZ						56	2.2	5.0	500M
1N5880A	S			DZ						60	2.1	10	500M
1N5880B	S			DZ						60	2.1	5.0	500M
1N5881A	S			DZ						62	2.0	10	500M
1N5881B	S			DZ						62	2.0	5.0	500M
1N5882A	S			DZ						68	1.8	10	500M
1N5882B	S			DZ						68	1.8	5.0	500M
1N5883A	S			DZ						75	1.7	10	500M
1N5883B	S			DZ						75	1.7	5.0	500M
1N5884A	S			DZ						82	1.5	10	500M
1N5884B	S			DZ						82	1.5	5.0	500M
1N5885A	S			DZ						87	1.4	10	500M
1N5885B	S			DZ						87	1.4	5.0	500M
1N5886A	S			DZ						91	1.4	10	500M
1N5886B	S			DZ						91	1.4	5.0	500M
1N5887A	S			DZ						100	1.3	10	500M
1N5887B	S			DZ						100	1.3	5.0	500M
1N5888A	S			DZ						110	1.1	10	500M
1N5888B	S			DZ						110	1.1	5.0	500M
1N5889A	S			DZ						120	1.0	10	500M
1N5889B	S			DZ						120	1.0	5.0	500M
1N5890A	S			DZ						130	0.95	10	500M
1N5890B	S			DZ						130	0.95	5.0	500M
1N5891A	S			DZ						140	0.90	10	500M
1N5891B	S			DZ						140	0.90	5.0	500M
1N5892A	S			DZ						150	0.85	10	500M
1N5892B	S			DZ						150	0.85	5.0	500M
1N5893A	S			DZ						160	0.80	10	500M
1N5893B	S			DZ						160	0.80	5.0	500M
1N5894A	S			DZ						170	0.74	10	500M
1N5894B	S			DZ						170	0.74	5.0	500M
1N5895A	S			DZ						180	0.68	10	500M
1N5895B	S			DZ						180	0.68	5.0	500M
1N5896A	S			DZ						190	0.66	10	500M
1N5896B	S			DZ						190	0.66	5.0	500M
1N5897A	S			DZ						200	0.65	10	500M
1N5897B	S			DZ						200	0.65	5.0	500M



## 4-LAYER DIODES

### INDEX AND SHORT-FORM SPECIFICATIONS

This table contains a numerical listing and short-form specifications with EIA-registered 1N numbers.

#### KEY

TYPE	REPLACE- MENT	REF.	V <sub>(BR)F</sub> (volts)		I <sub>H</sub> (mA)		V <sub>F</sub> @ I <sub>F</sub>		I <sub>F</sub> (mA)	P <sub>D</sub>
			(min)	(max)	(min)	(max)	(volts)	(mA)	(max)	(mW)
Numerical listing of Registered Type Numbers										
Type number of recommended replacement or nearest electrical equivalent fully characterized in this book										
Reference device number indicates specific Data Sheet on which device is characterized										
Forward Breakover (Switching) Voltage required to switch the device from the "blocking" state to the "on" state (in volts dc)										
Holding Current — the value of current required to hold the diode in the conducting state										
Forward Voltage — the forward voltage across the device at a specified forward current, I <sub>F</sub>										
Forward Current — the continuous or dc value of forward current during the "on" state										
Steady state power dissipation										



## 4-LAYER DIODES INDEX

1N3299-1N5793

TYPE	REPLACE- MENT	REF.	V <sub>(BR)F</sub> (volts)		I <sub>H</sub> (mA)		V <sub>F</sub> @	I <sub>F</sub> (mA)	I <sub>F</sub> (mA)	P <sub>D</sub> (mW)
			(min)	(max)	(min)	(max)				
1N3299			36	44	1.0	15				150
1N3300			14.4	21.6	1.0	15	1.5	30	200	400
1N3300A			16.2	19.8	1.0	15	1.5	30	200	400
1N3301			17.6	26.4	1.0	15	1.5	30	200	400
1N3301A			19.8	24.2	1.0	15	1.5	30	200	400
1N3302			21.6	32.4	5.0	20	1.5	30	200	400
1N3302A			24.3	29.7	5.0	20	1.5	30	200	400
1N3303			26.4	39.6	5.0	20	1.5	30	200	400
1N3303A			29.7	36.3	5.0	20	1.5	30	200	400
1N3304			31.2	46.8	5.0	20	1.5	30	200	400
1N3304A			35.1	42.9	5.0	20	1.5	30	200	400
1N3489			16	24	1.0	6.0				150
1N3489A			16	24	1.0	6.0				150
1N3490			16	24	14	45				150
1N3771						4.0	1.2			
1N3772						50	1.2			
1N3831			16	24	0.5	15	1.2	15	150	150
1N3832			21	29	0.5	15	1.2	15	150	150
1N3833			26	34	0.5	15	1.2	15	150	150
1N3834			31	39	0.5	15	1.2	15	150	150
1N3835			36	44	0.5	15	1.2	15	150	150
1N3836			41	49	0.5	15	1.2	15	150	150
1N3837			46	54	0.5	15	1.2	15	150	150
1N3838			90	110	0.5	15	1.2	15	150	150
1N3839			16	24	14	50	1.2	50	150	150
1N3840			21	29	14	50	1.2	50	150	150
1N3841			26	34	14	50	1.2	50	150	150
1N3842			31	39	14	50	1.2	50	150	150
1N3843			36	44	14	50	1.2	50	150	150
1N3844			41	49	14	50	1.2	50	150	150
1N3845			46	54	14	50	1.2	50	150	150
1N3846			90	110	14	50	1.2	50	150	150
1N3935				30		30				
1N3936				20		8.0				
1N3937				100		3.5				
1N5158	1N5158	1N5158	8.0	10	1.0	20	1.5	150	150	150
1N5159	1N5159	1N5158	9.0	11	1.0	20	1.5	150	150	150
1N5160	1N5160	1N5158	10	12	1.0	20	1.5	150	150	150
1N5799			11	13	1.0	20	1.5	150	500	150
1N5780			12	14	1.0	20	1.5	150	500	150
1N5781			13	15	1.0	20	1.5	150	500	150
1N5782			8.0	10	10	50	1.5	150	500	150
1N5783			9.0	11	10	50	1.5	150	500	150
1N5784			10	12	10	50	1.5	150	500	150
1N5785			11	13	10	50	1.5	150	500	150
1N5786			12	14	10	50	1.5	150	500	150
1N5787			13	15	10	50	1.5	150	500	150
1N5788			8.0	10	0.1	2.0	1.5	150	500	150
1N5789			9.0	11	0.1	2.0	1.5	150	500	150
1N5790			10	12	0.1	2.0	1.5	150	500	150
1N5791			11	13	0.1	2.0	1.5	150	500	150
1N5792			12	14	0.1	2.0	1.5	150	500	150
1N5793			13	15	0.1	2.0	1.5	150	500	150



TRANSIENT SUPPRESSOR DIODES

INDEX AND SHORT FORM SPECIFICATIONS

The following table provides a numerical index and short-form specifications for voltage transient suppressor diodes with EIA-registered type numbers.

KEY

TYPE	REPLACE- MENT	REFERENCE	$V_{(BR)R}$	$I_R$	$V_{RM}$	$V_R$	$i_R$	TC
Numerical Listing of Registered Type Numbers.	Type number of recommended replacement or of nearest electrical equivalent fully characterized in this book	Reference device number indicates specific Data Sheet on which device is characterized						
Type number of recommended replacement or of nearest electrical equivalent fully characterized in this book								
Reference device number indicates specific Data Sheet on which device is characterized								
Breakdown Voltage								
Reverse Current								
Reverse Voltage (working) @ $T_A = 25^{\circ}C$								
Peak Reverse Voltage during Reverse Surge								
Maximum Surge Current								
Temperature Coefficient of Breakdown Voltage								



TYPE	MATERIAL	REPLACEMENT	REFERENCE	$V_{BR}$	$I_R$	$V_{RM}$	$V_R$	$I_R$	TC
				Volts (min)	mAdc	Volts (wkg)	Volts	(surge) AMP (max)	
1N5555	S	1N2991B	1N2970	33	0.005	21.5	30.5		0.093
1N5556	S	1N2995B	1N2970	43.7	0.005	28.5	40.3		0.094
1N5557	S	1N2997B	1N2970	54	0.005	34.5	49		0.096
1N5558	S	1N3015B	1N2970	191	0.005	124	175		0.100
1N5610	S	1N2991B	1N2970	33	1.0		30.5	32	+0.1
1N5611	S	1N2995B	1N2970	43.7	1.0		40.3	24	+0.1
1N5612	S	1N2997B	1N2970	54	1.0		49	19	+0.1
1N5613	S	1N3015B	1N2970	191	1.0		175	5.7	+0.1
1N5629	S	1N2970A	1N2970	6.12	10	5.5	10.8	139	0.057
1N5629A	S	1N2970B	1N2970	6.45	10	5.8	10.5	143	0.057
1N5630	S	1N2971A	1N2970	6.75	10	6.05	11.7	128	0.061
1N5630A	S	1N2971B	1N2970	7.13	10	6.40	11.3	132	0.061
1N5631	S	1N2972A	1N2970	7.38	10	6.63	12.5	120	0.065
1N5631A	S	1N2972B	1N2970	7.79	10	7.02	12.1	124	0.065
1N5632	S	1N2973A	1N2970	8.19	1.0	7.37	13.8	109	0.068
1N5632A	S	1N2973B	1N2970	8.65	1.0	7.78	13.4	112	0.068
1N5633	S	1N2974A	1N2970	9.0	1.0	8.10	15	100	0.073
1N5633A	S	1N2974B	1N2970	9.5	1.0	8.55	1.45	103	0.073
1N5634	S	1N2975A	1N2970	9.9	1.0	8.92	16.2	93	0.075
1N5634A	S	1N2975B	1N2970	10.5	1.0	9.40	15.6	96	0.075
1N5635	S	1N2976A	1N2970	10.8	1.0	9.72	17.3	87	0.078
1N5635A	S	1N2976B	1N2970	11.4	1.0	10	16.7	90	0.078
1N5636	S	1N2977A	1N2970	11.7	1.0	10.5	19	79	0.081
1N5636A	S	1N2977B	1N2970	12.4	1.0	11.1	18.2	82	0.081
1N5637	S	1N2979A	1N2970	13.5	1.0	12.1	22	68	0.084
1N5637A	S	1N2979B	1N2970	14.3	1.0	12.8	21.2	71	0.084
1N5638	S	1N2980A	1N2970	14.4	1.0	12.9	23.5	64	0.086
1N5638A	S	1N2980B	1N2970	15.2	1.0	13.6	22.5	67	0.086
1N5639	S	1N2982A	1N2970	16.2	1.0	14.5	26.5	56.5	0.088
1N5639A	S	1N2982B	1N2970	17.1	1.0	15.3	25.2	59.5	0.088
1N5640	S	1N2984A	1N2970	18	1.0	16.2	29.1	51.5	0.090
1N5640A	S	1N2984B	1N2970	19	1.0	17.1	27.7	54	0.090
1N5641	S	1N2985A	1N2970	19.8	1.0	17.8	31.9	47	0.092
1N5641A	S	1N2985B	1N2970	20.9	1.0	18.8	30.6	49	0.092
1N5642	S	1N2986A	1N2970	21.6	1.0	19.4	34.7	43	0.094
1N5642A	S	1N2986B	1N2970	22.8	1.0	20.5	33.2	45	0.094
1N5643	S	1N2988A	1N2970	24.3	1.0	21.8	39.1	38.5	0.096
1N5643A	S	1N2988B	1N2970	25.7	1.0	23.1	37.5	40	0.096
1N5644	S	1N2989A	1N2970	27	1.0	24.3	43.5	34.5	0.097
1N5644A	S	1N2989B	1N2970	28.5	1.0	25.6	41.4	36	0.097
1N5645	S	1N2990A	1N2970	29.7	1.0	26.8	47.7	31.5	0.098
1N5645A	S	1N2990B	1N2970	31.4	1.0	28.2	45.7	33	0.098
1N5646	S	1N2991A	1N2970	32.4	1.0	29.1	52	29	0.099
1N5646A	S	1N2991B	1N2970	34.2	1.0	30.8	49.9	30	0.099
1N5647	S	1N2992A	1N2970	35.1	1.0	31.6	56.4	26.5	0.100
1N5647A	S	1N2992B	1N2970	37.1	1.0	33.3	53.9	28	0.100
1N5648	S	1N2993A	1N2970	38.7	1.0	34.8	61.9	24	0.101
1N5648A	S	1N2993B	1N2970	40.9	1.0	36.8	59.3	25.3	0.101
1N5649	S	1N2995A	1N2970	42.3	1.0	38.1	67.8	22.2	0.101
1N5649A	S	1N2995B	1N2970	44.7	1.0	40.2	64.8	23.2	0.101
1N5650	S	1N2997A	1N2970	45.9	1.0	41.3	73.5	20.4	0.102
1N5650A	S	1N2997B	1N2970	48.5	1.0	43.6	70.1	21.4	0.102
1N5651	S	1N2999A	1N2970	50.4	1.0	45.4	80.5	18.6	0.103
1N5651A	S	1N2999B	1N2970	53.2	1.0	47.8	77	19.5	0.103
1N5652	S	1N3000A	1N2970	55.8	1.0	50.2	89	16.9	0.104
1N5652A	S	1N3000B	1N2970	58.9	1.0	53	85	17.7	0.104
1N5653	S	1N3001A	1N2970	61.2	1.0	55.1	98	15.3	0.104
1N5653A	S	1N3001B	1N2970	64.6	1.0	58.1	92	16.3	0.104
1N5654	S	1N3002A	1N2970	67.5	1.0	60.7	108	13.9	0.105
1N5654A	S	1N3002B	1N3970	71.3	1.0	64.1	103	14.6	0.105
1N5655	S	1N3003A	1N2970	73.8	1.0	66.4	118	12.7	0.105
1N5655A	S	1N3003B	1N2970	77.9	1.0	70.1	113	13.3	0.105
1N5656	S	1N3004A	1N2970	81.9	1.0	73.7	131	11.4	0.106
1N5656A	S	1N3004B	1N2970	86.5	1.0	77.8	125	12	0.106
1N5657	S	1N3005A	1N2970	90	1.0	81	144	10.4	0.106
1N5657A	S	1N3005B	1N2970	95	1.0	85.5	137	11	0.106
1N5658	S	1N3007A	1N2970	99	1.0	89.2	158	9.5	0.107
1N5658A	S	1N3007B	1N2970	105	1.0	94	152	9.9	0.107
1N5659	S	1N3008A	1N2970	108	1.0	97.2	173	8.7	0.107
1N5659A	S	1N3008B	1N2970	114	1.0	102	165	9.1	0.107
1N5660	S	1N3009A	1N2970	117	1.0	105	187	8.0	0.107
1N560A	S	1N3009B	1N2970	124	1.0	111	179	8.4	0.107
1N5661	S	1N3011A	1N2970	135	1.0	121	215	7.0	0.108
1N5661A	S	1N3011B	1N2970	143	1.0	128	207	7.2	0.108
1N5662	S	1N3012A	1N2970	144	1.0	130	230	6.5	0.108
1N5662A	S	1N3012B	1N2970	152	1.0	136	219	6.8	0.108
1N5663	S	1N3013A	1N2970	153	1.0	138	244	6.2	0.108
1N5663A	S	1N3013B	1N2970	162	1.0	145	234	6.4	0.108
1N5664	S	1N3014A	1N2970	162	1.0	146	258	5.8	0.108
1N5664A	S	1N3014B	1N2970	171	1.0	154	246	6.1	0.108
1N5665	S	1N3015A	1N2970	180	1.0	162	287	5.2	0.108
1N5665A	S	1N3015B	1N2970	190	1.0	171	274	5.5	0.108



## VARACTOR DIODES

### INDEX AND SHORT-FORM SPECIFICATIONS

The following table provides a numerical index and short-form specifications for varactor diodes with EIA-registered type numbers.

#### KEY

TYPE	REF.	CAPACITANCE						BV <sub>R</sub>	Q @ f GHz	P <sub>D</sub> @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
Numerical Listing of Registered Type Numbers										
Reference device number indicates specific Data Sheet on which device is characterized										
Nominal Capacitance usually C <sub>J</sub> (junction capacitance) With *, specified value is C <sub>T</sub> (total capacitance) C <sub>T</sub> = C <sub>J</sub> + C <sub>c</sub>										
Tolerance of capacitance listed in preceding column										
Effective tuning Ratio (Capacitance at Voltage V <sub>1</sub> divided by capacitance at Voltage V <sub>2</sub> )										
Voltage range over which the tuning range is measured										
Reverse Breakdown Voltage										
Figure of Merit at this specified frequency										
Power Dissipation at 25°C										



VARACTOR DIODES INDEX

1N950-1N4793D

TYPE	REF.	CAPACITANCE						BV <sub>R</sub>	Q @ f		P <sub>D</sub> @ 25°C
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range						
					V <sub>1</sub> Volts	V <sub>2</sub> Volts	Volts	GHz	Watts		
1N950		35		2.51	4.0	130	130	7.0	0.05		
1N951		50		2.4	4.0	80	80	7.0	0.05		
1N952		70		2.43	4.0	60	60	7.0	0.05		
1N953		100		2.4	4.0	25	25	7.0	0.05		
1N954		35		2.51	4.0	25	25	7.0	0.05		
1N955		50		2.4	4.0	25	25	7.0	0.05		
1N956		70		2.43	4.0	25	25	7.0	0.05		
1N2627		2.75		1.75	0	5.0	5.0	10	1.0		
1N2628		2.5		1.5	0	5.0	5.0	14	1.0		
1N3182		33					20	65	0.05	0.163	
1N3488		56					15	7.0	0.05		
1N3551	1N5472A	50	6.0	1.38	4.0	8.0	11	30	0.05		
1N3552	1N5447A	21.5	6.0				22	25	0.05		
1N3554	1N5141A	12					100				
1N3555	1N5144	20					100	60	0.05		
1N3556	1N5148	47					100	50	0.10		
1N3557	1N5144	24					210	75	0.05		
1N3627	1N5477A	21.3		2.45	4.0	20	20	25	0.05		
1N3628	1N5452A	50		2.5	4.0	20	20	30	0.05		
1N3770		2.0					5.5				
1N3945	1N5447A	20		1.5	4.0	20	20	7.0	0.05	0.50	
1N3946	1N5457A	71					9.0	7.0	0.05	0.50	
1N3947	1N5474A	70					9.0	9.0	0.05		
1N4091	1N5461A	4.2		2.5			6.0			0.30	
1N4387	1N4387	35					150	150	0.05	20	
1N4388	1N4388	20					100	200	0.05	10	
1N4598		22		4.04	4.0	90	90	50	0.05	0.25	
1N4599		47		5.0	2.0	100	110	100	0.05	0.50	
1N4609		22		2.64	4.0	35	35	60	0.05	0.25	
1N4786	1N5441A	6.8	20	2.56	0	4.0	25	15	0.05	0.50	
1N4786A	1N5441A	6.8	10	2.56	0	4.0	25	15	0.05	0.50	
1N4786B	1N5441B	6.8	5.0	2.56	0	4.0	25	15	0.05	0.50	
1N4786C	1N5441C	6.8	2.0	2.56	0	4.0	25	15	0.05	0.50	
1N4786D	1N5441D	6.8	1.0	2.56	0	4.0	25	15	0.05	0.50	
1N4787	1N5442A	8.2	20	2.56	0	4.0	25	15	0.05	0.50	
1N4787A	1N5442A	8.2	10	2.56	0	4.0	25	15	0.05	0.50	
1N4787B	1N5442B	8.2	5.0	2.56	0	4.0	25	15	0.05	0.50	
1N4787C	1N5442C	8.2	2.0	2.56	0	4.0	25	15	0.05	0.50	
1N4787D	1N5442D	8.2	1.0	2.56	0	4.0	25	15	0.05	0.50	
1N4788	1N5443A	10	20	2.50	0	4.0	25	15	0.05	0.50	
1N4788A	1N5443A	10	10	2.50	0	4.0	25	15	0.05	0.50	
1N4788B	1N5443B	10	5.0	2.50	0	4.0	25	15	0.05	0.50	
1N4788C	1N5443C	10	2.0	2.50	0	4.0	25	15	0.05	0.50	
1N4788D	1N5443D	10	1.0	2.50	0	4.0	25	15	0.05	0.50	
1N4789	1N5444A	12	20	2.49	0	4.0	25	15	0.05	0.50	
1N4789A	1N5444A	12	10	2.49	0	4.0	25	15	0.05	0.50	
1N4789B	1N5444B	12	5.0	2.49	0	4.0	25	15	0.05	0.50	
1N4789C	1N5444C	12	2.0	2.49	0	4.0	25	15	0.05	0.50	
1N4789D	1N5444D	12	1.0	2.49	0	4.0	25	15	0.05	0.50	
1N4790	1N5445A	15	20	2.49	0	4.0	25	15	0.05	0.50	
1N4790A	1N5445A	15	10	2.49	0	4.0	25	15	0.05	0.50	
1N4790B	1N5445B	15	5.0	2.49	0	4.0	25	15	0.05	0.50	
1N4790C	1N5445C	15	2.0	2.49	0	4.0	25	15	0.05	0.50	
1N4790D	1N5445D	15	1.0	2.49	0	4.0	25	15	0.05	0.50	
1N4791	1N5446A	18	20	2.48	0	4.0	20	15	0.05	0.50	
1N4791A	1N5446A	18	10	2.48	0	4.0	20	15	0.05	0.50	
1N4791B	1N5446B	18	5.0	2.48	0	4.0	20	15	0.05	0.50	
1N4791C	1N5446C	18	2.0	2.48	0	4.0	20	15	0.05	0.50	
1N4791D	1N5446D	18	1.0	2.48	0	4.0	20	15	0.05	0.50	
1N4792	1N5448A	22	20	2.46	0	4.0	20	15	0.05	0.50	
1N4792A	1N5448A	22	10	2.46	0	4.0	20	15	0.05	0.50	
1N4792B	1N5448B	22	5.0	2.46	0	4.0	20	15	0.05	0.50	
1N4792C	1N5448C	22	2.0	2.46	0	4.0	20	15	0.05	0.50	
1N4792D	1N5448D	22	1.0	2.46	0	4.0	20	15	0.05	0.50	
1N4793	1N5449A	27	20	2.46	0	4.0	20	15	0.05	0.50	
1N4793A	1N5449A	27	10	2.46	0	4.0	20	15	0.05	0.50	
1N4793B	1N5449B	27	5.0	2.46	0	4.0	20	15	0.05	0.50	
1N4793C	1N5449C	27	2.0	2.46	0	4.0	20	15	0.05	0.50	
1N4793D	1N5449D	27	1.0	2.46	0	4.0	20	15	0.05	0.50	



# VARACTOR DIODES INDEX (continued)

1N4794—1N4807D

TYPE	REF.	CAPACITANCE					BV <sub>R</sub> Volts	Q @ f GHz Watts		P <sub>D</sub> @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
1N4794	1N5450A	33	20	2.46	0	4.0	20	15	0.05	0.50
1N4794A	1N5450A	33	10	2.46	0	4.0	20	15	0.05	0.50
1N4794B	1N5450B	33	5.0	2.46	0	4.0	20	15	0.05	0.50
1N4794C	1N5450C	33	2.0	2.46	0	4.0	20	15	0.05	0.50
1N4794D	1N5450D	33	1.0	2.46	0	4.0	20	15	0.05	0.50
1N4795	1N5451A	39	20	2.44	0	4.0	20	15	0.05	0.50
1N4795A	1N5451A	39	10	2.44	0	4.0	20	15	0.05	0.50
1N4795B	1N5451B	39	5.0	2.44	0	4.0	20	15	0.05	0.50
1N4795C	1N5451C	39	2.0	2.44	0	4.0	20	15	0.05	0.50
1N4795D	1N5451D	39	1.0	2.44	0	4.0	20	15	0.05	0.50
1N4796	1N5452A	47	20	2.43	0	4.0	20	15	0.05	0.50
1N4796A	1N5452A	47	10	2.43	0	4.0	20	15	0.05	0.50
1N4796B	1N5452B	47	5.0	2.43	0	4.0	20	15	0.05	0.50
1N4796C	1N5452C	47	2.0	2.43	0	4.0	20	15	0.05	0.50
1N4796D	1N5452D	47	1.0	2.43	0	4.0	20	15	0.05	0.50
1N4797	1N5453A	56	20	2.42	0	4.0	15	15	0.05	0.50
1N4797A	1N5453A	56	10	2.42	0	4.0	15	15	0.05	0.50
1N4797B	1N5453B	56	5.0	2.42	0	4.0	15	15	0.05	0.50
1N4797C	1N5453C	56	2.0	2.42	0	4.0	15	15	0.05	0.50
1N4797D	1N5453D	56	1.0	2.42	0	4.0	15	15	0.05	0.50
1N4798	1N5454A	68	20	2.40	0	4.0	15	15	0.05	0.50
1N4798A	1N5454A	68	10	2.40	0	4.0	15	15	0.05	0.50
1N4798B	1N5454B	68	5.0	2.40	0	4.0	15	15	0.05	0.50
1N4798C	1N5454C	68	2.0	2.40	0	4.0	15	15	0.05	0.50
1N4798D	1N5454D	68	1.0	2.40	0	4.0	15	15	0.05	0.50
1N4799	1N5455A	82	20	2.36	0	4.0	15	15	0.05	0.50
1N4799A	1N5455A	82	10	2.36	0	4.0	15	15	0.05	0.50
1N4799B	1N5455B	82	5.0	2.36	0	4.0	15	15	0.05	0.50
1N4799C	1N5455C	82	2.0	2.36	0	4.0	15	15	0.05	0.50
1N4799D	1N5455D	82	1.0	2.36	0	4.0	15	15	0.05	0.50
1N4800	1N5456A	100	20	2.33	0	4.0	15	15	0.05	0.50
1N4800A	1N5456A	100	10	2.33	0	4.0	15	15	0.05	0.50
1N4800B	1N5456B	100	5.0	2.33	0	4.0	15	15	0.05	0.50
1N4800C	1N5456C	100	2.0	2.33	0	4.0	15	15	0.05	0.50
1N4800D	1N5456D	100	1.0	2.33	0	4.0	15	15	0.05	0.50
1N4801	1N5139	6.8	20	2.56	0	4.0	100	15	0.05	0.50
1N4801A	1N5139A	6.8	10	2.56	0	4.0	100	15	0.05	0.50
1N4801B	1N5139B	6.8	5.0	2.56	0	4.0	100	15	0.05	0.50
1N4801C	1N5139C	6.8	2.0	2.56	0	4.0	100	15	0.05	0.50
1N4801D	1N5139D	6.8	1.0	2.56	0	4.0	100	15	0.05	0.50
1N4802	1N5462A	8.2	20	2.58	0	4.0	100	15	0.05	0.50
1N4802A	1N5462A	8.2	10	2.58	0	4.0	100	15	0.05	0.50
1N4802B	1N5462B	8.2	5.0	2.58	0	4.0	100	15	0.05	0.50
1N4802C	1N5462C	8.2	2.0	2.58	0	4.0	100	15	0.05	0.50
1N4802D	1N5462D	8.2	1.0	2.58	0	4.0	100	15	0.05	0.50
1N4803	1N5140	10	20	2.50	0	4.0	100	15	0.05	0.50
1N4803A	1N5140A	10	10	2.50	0	4.0	100	15	0.05	0.50
1N4803B	1N5140B	10	5.0	2.50	0	4.0	100	15	0.05	0.50
1N4803C	1N5140C	10	2.0	2.50	0	4.0	100	15	0.05	0.50
1N4803D	1N5140D	10	1.0	2.50	0	4.0	100	15	0.05	0.50
1N4804	1N5141	12	20	2.49	0	4.0	100	15	0.05	0.50
1N4804A	1N5141A	12	10	2.49	0	4.0	100	15	0.05	0.50
1N4804B	1N5141B	12	5.0	2.49	0	4.0	100	15	0.05	0.50
1N4804C	1N5141C	12	2.0	2.49	0	4.0	100	15	0.05	0.50
1N4804D	1N5141D	12	1.0	2.49	0	4.0	100	15	0.05	0.50
1N4805	1N5142	15	20	2.49	0	4.0	100	15	0.05	0.50
1N4805A	1N5142A	15	10	2.49	0	4.0	100	15	0.05	0.50
1N4805B	1N5142B	15	5.0	2.49	0	4.0	100	15	0.05	0.50
1N4805C	1N5142C	15	2.0	2.49	0	4.0	100	15	0.05	0.50
1N4805D	1N5142D	15	1.0	2.49	0	4.0	100	15	0.05	0.50
1N4806	1N5143	18	20	2.48	0	4.0	90	15	0.05	0.50
1N4806A	1N5143A	18	10	2.48	0	4.0	90	15	0.05	
1N4806B	1N5143B	18	5.0	2.48	0	4.0	90	15	0.05	
1N4806C	1N5143C	18	2.0	2.48	0	4.0	90	15	0.05	
1N4806D	1N5143D	18	1.0	2.48	0	4.0	90	15	0.05	
1N4807	1N5144	22	20	2.46	0	4.0	90	15	0.05	
1N4807A	1N5144A	22	10	2.46	0	4.0	90	15	0.05	
1N4807B	1N5144B	22	5.0	2.46	0	4.0	90	15	0.05	
1N4807C	1N5144C	22	2.0	2.46	0	4.0	90	15	0.05	
1N4807D	1N5144D	22	1.0	2.46	0	4.0	90	15	0.05	



# VARACTOR DIODES INDEX (continued)

1N4808-1N5153

TYPE	REF.	CAPACITANCE					BV <sub>R</sub>	Q @ f		P <sub>D</sub> @ 25°C
		C <sub>J</sub> C <sub>T</sub> <sup>*</sup> pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
1N4808	1N5145	27	20	2.46	0	4.0	65	15	0.05	0.50
1N4808A	1N5145A	27	10	2.46	0	4.0	65	15	0.05	0.50
1N4808B	1N5145B	27	5.0	2.46	0	4.0	65	15	0.05	0.50
1N4808C	1N5145C	27	2.0	2.46	0	4.0	65	15	0.05	0.50
1N4808D	1N5145D	27	1.0	2.46	0	4.0	65	15	0.05	0.50
1N4809	1N5146	33	20	2.46	0	4.0	60	15	0.05	0.50
1N4809A	1N5146A	33	10	2.46	0	4.0	60	15	0.05	0.50
1N4809B	1N5146B	33	5.0	2.46	0	4.0	60	15	0.05	0.50
1N4809C	1N5146C	33	2.0	2.46	0	4.0	60	15	0.05	0.50
1N4809D	1N5146D	33	1.0	2.46	0	4.0	60	15	0.05	0.50
1N4810	1N5147	39	20	2.44	0	4.0	55	15	0.05	0.50
1N4810A	1N5147A	39	10	2.44	0	4.0	55	15	0.05	0.50
1N4810B	1N5147B	39	5.0	2.44	0	4.0	55	15	0.05	0.50
1N4810C	1N5147C	39	2.0	2.44	0	4.0	55	15	0.05	0.50
1N4810D	1N5147D	39	1.0	2.44	0	4.0	55	15	0.05	0.50
1N4811	1N5148	47	20	2.43	0	4.0	50	15	0.05	0.50
1N4811A	1N5148A	47	10	2.43	0	4.0	50	15	0.05	0.50
1N4811B	1N5148B	47	5.0	2.43	0	4.0	50	15	0.05	0.50
1N4811C	1N5148C	47	2.0	2.43	0	4.0	50	15	0.05	0.50
1N4811D	1N5148D	47	1.0	2.43	0	4.0	50	15	0.05	0.50
1N4812	1N5148	56	20	2.42	0	4.0	40	15	0.05	0.50
1N4812A	1N5148A	56	10	2.42	0	4.0	40	15	0.05	0.50
1N4812B	1N5148B	56	5.0	2.42	0	4.0	40	15	0.05	0.50
1N4812C	1N5148C	56	2.0	2.42	0	4.0	40	15	0.05	0.50
1N4812D	1N5148D	56	1.0	2.42	0	4.0	40	15	0.05	0.50
1N4813	1N5454A	68	20	2.40	0	4.0	30	15	0.05	0.50
1N4813A	1N5454A	68	10	2.40	0	4.0	30	15	0.05	0.50
1N4813B	1N5454B	68	5.0	2.40	0	4.0	30	15	0.05	0.50
1N4813C	1N5454C	68	2.0	2.40	0	4.0	30	15	0.05	0.50
1N4813D	1N5454D	68	1.0	2.40	0	4.0	30	15	0.05	0.50
1N4814		82	20	2.36	0	4.0	20	15	0.05	0.50
1N4814A		82	10	2.36	0	4.0	20	15	0.05	0.50
1N4814B		82	5.0	2.36	0	4.0	20	15	0.05	0.50
1N4814C		82	2.0	2.36	0	4.0	20	15	0.05	0.50
1N4814D		82	1.0	2.36	0	4.0	20	15	0.05	0.50
1N4815		100	20	2.33	0	4.0	20	15	0.05	0.50
1N4815A		100	10	2.33	0	4.0	20	15	0.05	0.50
1N4815B		100	5.0	2.33	0	4.0	20	15	0.05	0.50
1N4815C		100	2.0	2.33	0	4.0	20	15	0.05	0.50
1N4815D		100	1.0	2.33	0	4.0	20	15	0.05	0.50
1N4885		35		2.57	6.0	150	150			20
1N4886		35		2.57	6.0	120	120			20
1N4941		0.4		2.0	0	6.0	6.0	2000	10	0.1
1N5136		1.0*	20	2.2	4.0	60	60	350	0.05	0.4
1N5136A		1.0*	10	2.2	4.0	60	60	350	0.05	0.4
1N5137		2.2*	20	2.2	4.0	60	60	350	0.05	0.4
1N5137A		2.2*	10	2.2	4.0	60	60	350	0.05	0.4
1N5138		3.3*	20	2.4	4.0	60	60	350	0.05	0.4
1N5138A		3.3*	10	2.4	4.0	60	60	350	0.05	0.4
1N5139	1N5139	6.8*	10	2.9	4.0	60	60	350	0.05	0.4
1N5139A	1N5139A	6.8*	5.0	2.9	4.0	60	60	350	0.05	0.4
1N5140	1N5140	10*	10	3.0	4.0	60	60	300	0.05	0.4
1N5140A	1N5140A	10*	5.0	3.0	4.0	60	60	300	0.05	0.4
1N5141	1N5141	12*	10	3.0	4.0	60	60	300	0.05	0.4
1N5141A	1N5141A	12*	5.0	3.0	4.0	60	60	300	0.05	0.4
1N5142	1N5142	15*	10	3.0	4.0	60	60	250	0.05	0.4
1N5142A	1N5142A	15*	5.0	3.0	4.0	60	60	250	0.05	0.4
1N5143	1N5143	18*	10	3.0	4.0	60	60	250	0.05	0.4
1N5143A	1N5143A	18*	5.0	3.0	4.0	60	60	250	0.05	0.4
1N5144	1N5144	22*	10	3.4	4.0	60	60	200	0.05	0.4
1N5144A	1N5144A	22*	5.0	3.4	4.0	60	60	200	0.05	0.4
1N5145	1N5145	27*	10	3.4	4.0	60	60	200	0.05	0.4
1N5145A	1N5145A	27*	5.0	3.4	4.0	60	60	200	0.05	0.4
1N5146	1N5146	33*	10	3.4	4.0	60	60	200	0.05	0.4
1N5146A	1N5146A	33*	5.0	3.4	4.0	60	60	200	0.05	0.4
1N5147	1N5147	39*	10	3.4	4.0	60	60	200	0.05	0.4
1N5147A	1N5147A	39*	5.0	3.4	4.0	60	60	200	0.05	0.4
1N5148	1N5148	47*	10	3.4	4.0	60	60	200	0.05	0.4
1N5148A	1N5148A	47*	5.0	3.4	4.0	60	60	200	0.05	0.4
1N5149	1N5149	11.5*					80	800	0.05	10
1N5150	1N5149	11.5*					80	800	0.05	14
1N5150A	1N5150A	12	10				80	800	0.05	29.2
1N5151	1N5151	5.8*					75	1100	0.05	5.5
1N5152	1N5151	5.8*					75	1100	0.05	5.5
1N5152A	1N5150A	6.0	10				75	1100	0.05	11.7
1N5153	1N5151	5.8*					75	1100	0.05	5.5



# VARACTOR DIODES INDEX (continued)

## 1N5153A-1N5450D

TYPE	REF.	CAPACITANCE					BV <sub>R</sub>	Q @ f	P <sub>D</sub> @ 25°C	
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
1N5153A	1N5150A	6.4	10				75	1100	0.05	11.7
1N5154	1N5154	2.1*					35	1700	0.05	3.5
1N5155	1N5154	2.1*					35	1700	0.05	3.5
1N5155A	1N5150A	1.9	10				35	1700	0.05	8.75
1N5156	1N5156	0.8	25				20	3600	0.05	3.25*
1N5157	1N5156	0.8	25				20	3600	0.05	3.25*
1N5421		210	20	4.1	4.0	100	210	200	0.025	0.25
1N5422		340	20	4.1	4.0	100	210	200	0.025	0.25
1N5423		680	20	4.1	4.0	100	210	150	0.025	0.25
1N5424		680	20	4.2	4.0	100	115	300	0.010	0.25
1N5425		1370	20	4.2	4.0	100	115	200	0.010	0.25
1N5439		3.3*	20	2.3	2.0	30	30	450	0.05	0.4
1N5439A		3.3*	10	2.3	2.0	30	30	450	0.05	0.4
1N5439B		3.3*	5.0	2.3	2.0	30	30	450	0.05	0.4
1N5439C		3.3*	2.0	2.3	2.0	30	30	450	0.05	0.4
1N5439D		3.3*	1.0	2.3	2.0	30	30	450	0.05	0.4
1N5440		4.7*	20	2.4	2.0	30	30	450	0.05	0.4
1N5440A		4.7*	10	2.4	2.0	30	30	450	0.05	0.4
1N5440B		4.7*	5.0	2.4	2.0	30	30	450	0.05	0.4
1N5440C		4.7*	2.0	2.4	2.0	30	30	450	0.05	0.4
1N5440D		4.7*	1.0	2.4	2.0	30	30	450	0.05	0.4
1N5441	1N5441A	6.8*	20	2.5	2.0	30	30	450	0.05	0.4
1N5441A	1N5441A	6.8*	10	2.5	2.0	30	30	450	0.05	0.4
1N5441B	1N5441B	6.8*	5.0	2.5	2.0	30	30	450	0.05	0.4
1N5441C	1N5441C	6.8*	2.0	2.5	2.0	30	30	450	0.05	0.4
1N5441D	1N5441D	6.8*	1.0	2.5	2.0	30	30	450	0.05	0.4
1N5442		8.2*	20	2.5	2.0	30	30	450	0.05	0.4
1N5442A	1N5442A	8.2*	10	2.5	2.0	30	30	450	0.05	0.4
1N5442B	1N5442B	8.2*	5.0	2.5	2.0	30	30	450	0.05	0.4
1N5442C	1N5442C	8.2*	2.0	2.5	2.0	30	30	450	0.05	0.4
1N5442D	1N5442D	8.2*	1.0	2.5	2.0	30	30	450	0.05	0.4
1N5443		10*	20	2.6	2.0	30	30	400	0.05	0.4
1N5443A	1N5443A	10*	10	2.6	2.0	30	30	400	0.05	0.4
1N5443B	1N5443B	10*	5.0	2.6	2.0	30	30	400	0.05	0.4
1N5443C	1N5443C	10*	2.0	2.6	2.0	30	30	400	0.05	0.4
1N5443D	1N5443D	10*	1.0	2.6	2.0	30	30	400	0.05	0.4
1N5444		12*	20	2.6	2.0	30	30	400	0.05	0.4
1N5444A	1N5444A	12*	10	2.6	2.0	30	30	400	0.05	0.4
1N5444B	1N5444B	12*	5.0	2.6	2.0	30	30	400	0.05	0.4
1N5444C	1N5444C	12*	2.0	2.6	2.0	30	30	400	0.05	0.4
1N5444D	1N5444D	12*	1.0	2.6	2.0	30	30	400	0.05	0.4
1N5445		15*	20	2.6	2.0	30	30	400	0.05	0.4
1N5445A	1N5445A	15*	10	2.6	2.0	30	30	400	0.05	0.4
1N5445B	1N5445B	15*	5.0	2.6	2.0	30	30	400	0.05	0.4
1N5445C	1N5445C	15*	2.0	2.6	2.0	30	30	400	0.05	0.4
1N5445D	1N5445D	15*	1.0	2.6	2.0	30	30	400	0.05	0.4
1N5446		18*	20	2.6	2.0	30	30	350	0.05	0.4
1N5446A	1N5446A	18*	10	2.6	2.0	30	30	350	0.05	0.4
1N5446B	1N5446B	18*	5.0	2.6	2.0	30	30	350	0.05	0.4
1N5446C	1N5446C	18*	2.0	2.6	2.0	30	30	350	0.05	0.4
1N5446D	1N5446D	18*	1.0	2.6	2.0	30	30	350	0.05	0.4
1N5447		20*	20	2.6	2.0	30	30	350	0.05	0.4
1N5447A	1N5447A	20*	10	2.6	2.0	30	30	350	0.05	0.4
1N5447B	1N5447B	20*	5.0	2.6	2.0	30	30	350	0.05	0.4
1N5447C	1N5447C	20*	2.0	2.6	2.0	30	30	350	0.05	0.4
1N5447D	1N5447D	20*	1.0	2.6	2.0	30	30	350	0.05	0.4
1N5448		22*	20	2.6	2.0	30	30	350	0.05	0.4
1N5448A	1N5448A	22*	10	2.6	2.0	30	30	350	0.05	0.4
1N5448B	1N5448B	22*	5.0	2.6	2.0	30	30	350	0.05	0.4
1N5448C	1N5448C	22*	2.0	2.6	2.0	30	30	350	0.05	0.4
1N5448D	1N5448D	22*	1.0	2.6	2.0	30	30	350	0.05	0.4
1N5449		27*	20	2.6	2.0	30	30	350	0.05	0.4
1N5449A	1N5449A	27*	10	2.6	2.0	30	30	350	0.05	0.4
1N5449B	1N5449B	27*	5.0	2.6	2.0	30	30	350	0.05	0.4
1N5449C	1N5449C	27*	2.0	2.6	2.0	30	30	350	0.05	0.4
1N5449D	1N5449D	27*	1.0	2.6	2.0	30	30	350	0.05	0.4
1N5450		33*	20	2.6	2.0	30	30	350	0.05	0.4
1N5450A	1N5450A	33*	10	2.6	2.0	30	30	350	0.05	0.4
1N5450B	1N5450B	33*	5.0	2.6	2.0	30	30	350	0.05	0.4
1N5450C	1N5450C	33*	2.0	2.6	2.0	30	30	350	0.05	0.4
1N5450D	1N5450D	33*	1.0	2.6	2.0	30	30	350	0.05	0.4



VARACTOR DIODES INDEX (continued)

1N5451–1N5464D

TYPE	REF.	CAPACITANCE					BV <sub>R</sub> Volts	Q @ f	P <sub>D</sub> @ 25°C Watts	
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
1N5451		39*	20	2.6	2.0	30	30	300	0.05	0.4
1N5451A	1N5451A	39*	10	2.6	2.0	30	30	300	0.05	0.4
1N5451B	1N5451B	39*	5.0	2.6	2.0	30	30	300	0.05	0.4
1N5451C	1N5451C	39*	2.0	2.6	2.0	30	30	300	0.05	0.4
1N5451D	1N5451D	39*	1.0	2.6	2.0	30	30	300	0.05	0.4
1N5452		47*	20	2.6	2.0	30	30	250	0.05	0.4
1N5452A	1N5452A	47*	10	2.6	2.0	30	30	250	0.05	0.4
1N5452B	1N5452B	47*	5.0	2.6	2.0	30	30	250	0.05	0.4
1N5452C	1N5452C	47*	2.0	2.6	2.0	30	30	250	0.05	0.4
1N5452D	1N5452D	47*	1.0	2.6	2.0	30	30	250	0.05	0.4
1N5453		56*	20	2.6	2.0	30	30	200	0.05	0.4
1N5453A	1N5453A	56*	10	2.6	2.0	30	30	200	0.05	0.4
1N5453B	1N5453B	56*	5.0	2.6	2.0	30	30	200	0.05	0.4
1N5453C	1N5453C	56*	2.0	2.6	2.0	30	30	200	0.05	0.4
1N5453D	1N5453D	56*	1.0	2.6	2.0	30	30	200	0.05	0.4
1N5454		68*	20	2.7	2.0	30	30	175	0.05	0.4
1N5454A	1N5454A	68*	10	2.7	2.0	30	30	175	0.05	0.4
1N5454B	1N5454B	68*	5.0	2.7	2.0	30	30	175	0.05	0.4
1N5454C	1N5454C	68*	2.0	2.7	2.0	30	30	175	0.05	0.4
1N5454D	1N5454D	68*	1.0	2.7	2.0	30	30	175	0.05	0.4
1N5455		82*	20	2.7	2.0	30	30	175	0.05	0.4
1N5455A	1N5455A	82*	10	2.7	2.0	30	30	175	0.05	0.4
1N5455B	1N5455B	82*	5.0	2.7	2.0	30	30	175	0.05	0.4
1N5455C	1N5455C	82*	2.0	2.7	2.0	30	30	175	0.05	0.4
1N5455D	1N5455D	82*	1.0	2.7	2.0	30	30	175	0.05	0.4
1N5456		100*	20	2.7	2.0	30	30	175	0.05	0.4
1N5456A	1N5456A	100*	10	2.7	2.0	30	30	175	0.05	0.4
1N5456B	1N5456B	100*	5.0	2.7	2.0	30	30	175	0.05	0.4
1N5456C	1N5456C	100*	2.0	2.7	2.0	30	30	175	0.05	0.4
1N5456D	1N5456D	100*	1.0	2.7	2.0	30	30	175	0.05	0.4
1N5457		120*	20	2.7	2.0	30	30	150	0.05	0.4
1N5457A		120*	10	2.7	2.0	30	30	150	0.05	0.4
1N5457B		120*	5.0	2.7	2.0	30	30	150	0.05	0.4
1N5457C		120*	2.0	2.7	2.0	30	30	150	0.05	0.4
1N5457D		120*	1.0	2.7	2.0	30	30	150	0.05	0.4
1N5458		3.9*	20	2.5	2.0	30	30	600	0.05	0.4
1N5458A		3.9*	10	2.5	2.0	30	30	600	0.05	0.4
1N5458B		3.9*	5.0	2.5	2.0	30	30	600	0.05	0.4
1N5458C		3.9*	2.0	2.5	2.0	30	30	600	0.05	0.4
1N5458D		3.9*	1.0	2.5	2.0	30	30	600	0.05	0.4
1N5459		4.7*	20	2.6	2.0	30	30	600	0.05	0.4
1N5459A		4.7*	10	2.6	2.0	30	30	600	0.05	0.4
1N5459B		4.7*	5.0	2.6	2.0	30	30	600	0.05	0.4
1N5459C		4.7*	2.0	2.6	2.0	30	30	600	0.05	0.4
1N5459D		4.7*	1.0	2.6	2.0	30	30	600	0.05	0.4
1N5460		5.6*	20	2.6	2.0	30	30	600	0.05	0.4
1N5460A		5.6*	10	2.6	2.0	30	30	600	0.05	0.4
1N5460B		5.6*	5.0	2.6	2.0	30	30	600	0.05	0.4
1N5460C		5.6*	2.0	2.6	2.0	30	30	600	0.05	0.4
1N5460D		5.6*	1.0	2.6	2.0	30	30	600	0.05	0.4
1N5461		6.8*	20	2.7	2.0	30	30	600	0.05	0.4
1N5461A	1N5461A	6.8*	10	2.7	2.0	30	30	600	0.05	0.4
1N5461B	1N5461A	6.8*	5.0	2.7	2.0	30	30	600	0.05	0.4
1N5461C	1N5461A	6.8*	2.0	2.7	2.0	30	30	600	0.05	0.4
1N5461D	1N5461A	6.8*	1.0	2.7	2.0	30	30	600	0.05	0.4
1N5462		8.2*	20	2.8	2.0	30	30	600	0.05	0.4
1N5462A	1N5462A	8.2*	10	2.8	2.0	30	30	600	0.05	0.4
1N5462B	1N5462B	8.2*	5.0	2.8	2.0	30	30	600	0.05	0.4
1N5462C	1N5462C	8.2*	2.0	2.8	2.0	30	30	600	0.05	0.4
1N5462D	1N5462D	8.2*	1.0	2.8	2.0	30	30	600	0.05	0.4
1N5463		10*	20	2.8	2.0	30	30	550	0.05	0.4
1N5463A	1N5463A	10*	10	2.8	2.0	30	30	550	0.05	0.4
1N5463B	1N5463B	10*	5.0	2.8	2.0	30	30	550	0.05	0.4
1N5463C	1N5463C	10*	2.0	2.8	2.0	30	30	550	0.05	0.4
1N5463D	1N5463D	10*	1.0	2.8	2.0	30	30	550	0.05	0.4
1N5464		12*	20	2.8	2.0	30	30	550	0.05	0.4
1N5464A	1N5464A	12*	10	2.8	2.0	30	30	550	0.05	0.4
1N5464B	1N5464B	12*	5.0	2.8	2.0	30	30	550	0.05	0.4
1N5464C	1N5464C	12*	2.0	2.8	2.0	30	30	550	0.05	0.4
1N5464D	1N5464D	12*	1.0	2.8	2.0	30	30	550	0.05	0.4



# VARACTOR DIODES INDEX (continued)

1N5465-1N5476D

TYPE	REF.	CAPACITANCE					BV <sub>R</sub>	Q @ f		P <sub>D</sub> @ 25°C
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
1N5465		15*	20	2.8	2.0	30	30	550	0.05	0.4
1N5465A	1N5465A	15*	10	2.8	2.0	30	30	550	0.05	0.4
1N5465B	1N5465B	15*	5.0	2.8	2.0	30	30	550	0.05	0.4
1N5465C	1N5465C	15*	2.0	2.8	2.0	30	30	550	0.05	0.4
1N5465D	1N5465D	15*	1.0	2.8	2.0	30	30	550	0.05	0.4
1N5466		18*	20	2.9	2.0	30	30	500	0.05	0.4
1N5466A	1N5466A	18*	10	2.9	2.0	30	30	500	0.05	0.4
1N5466B	1N5466B	18*	5.0	2.9	2.0	30	30	500	0.05	0.4
1N5466C	1N5466C	18*	2.0	2.9	2.0	30	30	500	0.05	0.4
1N5466D	1N5466D	18*	1.0	2.9	2.0	30	30	500	0.05	0.4
1N5467		20*	20	2.9	2.0	30	30	500	0.05	0.4
1N5467A	1N5467A	20*	10	2.9	2.0	30	30	500	0.05	0.4
1N5467B	1N5467B	20*	5.0	2.9	2.0	30	30	500	0.05	0.4
1N5467C	1N5467C	20*	2.0	2.9	2.0	30	30	500	0.05	0.4
1N5467D	1N5467D	20*	1.0	2.9	2.0	30	30	500	0.05	0.4
1N5468		22*	20	2.9	2.0	30	30	500	0.05	0.4
1N5468A	1N5468A	22*	10	2.9	2.0	30	30	500	0.05	0.4
1N5468B	1N5468B	22*	5.0	2.9	2.0	30	30	500	0.05	0.4
1N5468C	1N5468C	22*	2.0	2.9	2.0	30	30	500	0.05	0.4
1N5468D	1N5468D	22*	1.0	2.9	2.0	30	30	500	0.05	0.4
1N5469		27*	20	2.9	2.0	30	30	500	0.05	0.4
1N5469A	1N5469A	27*	10	2.9	2.0	30	30	500	0.05	0.4
1N5469B	1N5469B	27*	5.0	2.9	2.0	30	30	500	0.05	0.4
1N5469C	1N5469C	27*	2.0	2.9	2.0	30	30	500	0.05	0.4
1N5469D	1N5469D	27*	1.0	2.9	2.0	30	30	500	0.05	0.4
1N5470		33*	20	2.9	2.0	30	30	500	0.05	0.4
1N5470A	1N5470A	33*	10	2.9	2.0	30	30	500	0.05	0.4
1N5470B	1N5470B	33*	5.0	2.9	2.0	30	30	500	0.05	0.4
1N5470C	1N5470C	33*	2.0	2.9	2.0	30	30	500	0.05	0.4
1N5470D	1N5470D	33*	1.0	2.9	2.0	30	30	500	0.05	0.4
1N5471		39*	20	2.9	2.0	30	30	450	0.05	0.4
1N5471A	1N5471A	39*	10	2.9	2.0	30	30	450	0.05	0.4
1N5471B	1N5471B	39*	5.0	2.9	2.0	30	30	450	0.05	0.4
1N5471C	1N5471C	39*	2.0	2.9	2.0	30	30	450	0.05	0.4
1N5471D	1N5471D	39*	1.0	2.9	2.0	30	30	450	0.05	0.4
1N5472		47*	20	2.9	2.0	30	30	400	0.05	0.4
1N5472A	1N5472A	47*	10	2.9	2.0	30	30	400	0.05	0.4
1N5472B	1N5472B	47*	5.0	2.9	2.0	30	30	400	0.05	0.4
1N5472C	1N5472C	47*	2.0	2.9	2.0	30	30	400	0.05	0.4
1N5472D	1N5472D	47*	1.0	2.9	2.0	30	30	400	0.05	0.4
1N5473		56*	20	2.9	2.0	30	30	300	0.05	0.4
1N5473A	1N5473A	56*	10	2.9	2.0	30	30	300	0.05	0.4
1N5473B	1N5473B	56*	5.0	2.9	2.0	30	30	300	0.05	0.4
1N5473C	1N5473C	56*	2.0	2.9	2.0	30	30	300	0.05	0.4
1N5473D	1N5473D	56*	1.0	2.9	2.0	30	30	300	0.05	0.4
1N5474		68*	20	2.9	2.0	30	30	250	0.05	0.4
1N5474A	1N5474A	68*	10	2.9	2.0	30	30	250	0.05	0.4
1N5474B	1N5474B	68*	5.0	2.9	2.0	30	30	250	0.05	0.4
1N5474C	1N5474C	68*	2.0	2.9	2.0	30	30	250	0.05	0.4
1N5474D	1N5474D	68*	1.0	2.9	2.0	30	30	250	0.05	0.4
1N5475		82*	20	2.9	2.0	30	30	225	0.05	0.4
1N5475A	1N5475A	82*	10	2.9	2.0	30	30	225	0.05	0.4
1N5475B	1N5475B	82*	5.0	2.9	2.0	30	30	225	0.05	0.4
1N5475C	1N5475C	82*	2.0	2.9	2.0	30	30	225	0.05	0.4
1N5475D	1N5475D	82*	1.0	2.9	2.0	30	30	225	0.05	0.4
1N5476		100*	20	2.9	2.0	30	30	200	0.05	0.4
1N5476A	1N5476A	100*	10	2.9	2.0	30	30	200	0.05	0.4
1N5476B	1N5476B	100*	5.0	2.9	2.0	30	30	200	0.05	0.4
1N5476C	1N5476C	100*	2.0	2.9	2.0	30	30	200	0.05	0.4
1N5476D	1N5476D	100*	1.0	2.9	2.0	30	30	200	0.05	0.4



VARACTOR DIODES INDEX (continued)

1N5681-1N5704

TYPE	REF.	CAPACITANCE						BV <sub>R</sub> Volts	Q @ f GHz		P <sub>D</sub> @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range						
					V <sub>1</sub> Volts	V <sub>2</sub> Volts					
1N5681	1N5461A	6.8	20	3.1	4.0	40	45	600	0.05	0.4	
1N5681A	1N5461A	6.8	10	3.1	4.0	40	45	600	0.05	0.4	
1N5681B	1N5461B	6.8	5.0	3.1	4.0	40	45	600	0.05	0.4	
1N5682	1N5462A	8.2	20	3.1	4.0	40	45	600	0.05	0.4	
1N5682A	1N5462A	8.2	10	3.1	4.0	40	45	600	0.05	0.4	
1N5682B	1N5462B	8.2	5.0	3.1	4.0	40	45	600	0.05	0.4	
1N5683	1N5463A	10	20	3.2	4.0	40	45	550	0.05	0.4	
1N5683A	1N5463A	10	10	3.2	4.0	40	45	550	0.05	0.4	
1N5683B	1N5463B	10	5.0	3.2	4.0	40	45	550	0.05	0.4	
1N5684	1N5464A	12	20	3.2	4.0	40	45	550	0.05	0.4	
1N5684A	1N5464A	12	10	3.2	4.0	40	45	550	0.05	0.4	
1N5684B	1N5464B	12	5.0	3.2	4.0	40	45	550	0.05	0.4	
1N5685	1N5465A	15	20	3.2	4.0	40	45	550	0.05	0.4	
1N5685A	1N5465A	15	10	3.2	4.0	40	45	550	0.05	0.4	
1N5685B	1N5465B	15	5.0	3.2	4.0	40	45	550	0.05	0.4	
1N5686	1N5457A	18	20	3.2	4.0	40	45	500	0.05	0.4	
1N5686A	1N5457A	18	10	3.2	4.0	40	45	500	0.05	0.4	
1N5686B	1N5457B	18	5.0	3.2	4.0	40	45	500	0.05	0.4	
1N5687	1N5458A	22	20	3.3	4.0	40	45	500	0.05	0.4	
1N5687A	1N5458A	22	10	3.3	4.0	40	45	500	0.05	0.4	
1N5687B	1N5458B	22	5.0	3.3	4.0	40	45	500	0.05	0.4	
1N5688	1N5469A	27	20	3.3	4.0	40	45	500	0.05	0.4	
1N5688A	1N5469A	27	10	3.3	4.0	40	45	500	0.05	0.4	
1N5688B	1N5469B	27	5.0	3.3	4.0	40	45	500	0.05	0.4	
1N5689	1N5470A	33	20	3.3	4.0	40	45	500	0.05	0.4	
1N5689A	1N5470A	33	10	3.3	4.0	40	45	500	0.05	0.4	
1N5689B	1N5470B	33	5.0	3.3	4.0	40	45	500	0.05	0.4	
1N5690	1N5471A	39	20	3.3	4.0	40	45	450	0.05	0.4	
1N5690A	1N5471A	39	10	3.3	4.0	40	45	450	0.05	0.4	
1N5690B	1N5471B	39	5.0	3.3	4.0	40	45	450	0.05	0.4	
1N5691	1N5472A	47	20	3.3	4.0	40	45	400	0.05	0.4	
1N5691A	1N5472A	47	10	3.3	4.0	40	45	400	0.05	0.4	
1N5691B	1N5472B	47	5.0	3.3	4.0	40	45	400	0.05	0.4	
1N5692	1N5473A	56	20	3.3	4.0	40	45	300	0.05	0.4	
1N5692A	1N5473A	56	10	3.3	4.0	40	45	300	0.05	0.4	
1N5692B	1N5473B	56	5.0	3.3	4.0	40	45	300	0.05	0.4	
1N5693	1N5474A	68	20	3.3	4.0	40	45	250	0.05	0.4	
1N5693A	1N5474A	68	10	3.3	4.0	40	45	250	0.05	0.4	
1N5693B	1N5474B	68	5.0	3.3	4.0	40	45	250	0.05	0.4	
1N5694	1N5475A	82	20	3.3	4.0	40	45	225	0.05	0.4	
1N5694A	1N5475A	82	10	3.3	4.0	40	45	225	0.05	0.4	
1N5694B	1N5475B	82	5.0	3.3	4.0	40	45	200	0.05	0.4	
1N5695	1N5476A	100	20	3.3	4.0	40	45	200	0.05	0.4	
1N5695A	1N5476A	100	10	3.3	4.0	40	45	200	0.05	0.4	
1N5695B	1N5476B	100	5.0	3.3	4.0	40	45	200	0.05	0.4	
1N5696	1N5461A	6.8	20	2.7	2.0	60	65	450	0.05	0.4	
1N5696A	1N5461A	6.8	10	2.7	2.0	60	65	450	0.05	0.4	
1N5696B	1N5461B	6.8	5.0	2.7	2.0	60	65	450	0.05	0.4	
1N5697	1N5462A	8.2	20	2.7	2.0	60	65	450	0.05	0.4	
1N5697A	1N5462A	8.2	10	2.7	2.0	60	65	450	0.05	0.4	
1N5697B	1N5462B	8.2	5.0	2.7	2.0	60	65	450	0.05	0.4	
1N5698	1N5463A	10	20	2.8	2.0	60	65	400	0.05	0.4	
1N5698A	1N5463A	10	10	2.8	2.0	60	65	400	0.05	0.4	
1N5698B	1N5463B	10	5.0	2.8	2.0	60	65	400	0.05	0.4	
1N5699	1N5464A	12	20	2.8	2.0	60	65	400	0.05	0.4	
1N5699A	1N5464A	12	10	2.8	2.0	60	65	400	0.05	0.4	
1N5699B	1N5464B	12	5.0	2.8	2.0	60	65	400	0.05	0.4	
1N5700	1N5465A	15	20	2.8	2.0	60	65	400	0.05	0.4	
1N5700A	1N5465A	15	10	2.8	2.0	60	65	400	0.05	0.4	
1N5700B	1N5465B	15	5.0	2.8	2.0	60	65	400	0.05	0.4	
1N5701	1N5467A	18	20	2.8	2.0	60	65	375	0.05	0.4	
1N5701A	1N5467A	18	10	2.8	2.0	60	65	375	0.05	0.4	
1N5701B	1N5467B	18	5.0	2.8	2.0	60	65	375	0.05	0.4	
1N5702	1N5468A	22	20	3.2	2.0	60	65	375	0.05	0.4	
1N5702A	1N5468A	22	10	3.2	2.0	60	65	375	0.05	0.4	
1N5702B	1N5468B	22	5.0	3.2	2.0	60	65	375	0.05	0.4	
1N5703	1N5469A	27	20	3.2	2.0	60	65	350	0.05	0.4	
1N5703A	1N5469A	27	10	3.2	2.0	60	65	350	0.05	0.4	
1N5703B	1N5469B	27	5.0	3.2	2.0	60	65	350	0.05	0.4	
1N5704	1N5470A	33	20	3.2	2.0	60	65	350	0.05	0.4	



# VARACTOR DIODES INDEX (continued)

## 1N5704A – 1N5710B

TYPE	REF.	CAPACITANCE					BV <sub>R</sub>	Q @ f		P <sub>D</sub> @ 25°C
		C <sub>J</sub> C <sub>T</sub> <sup>*</sup> pF	C Tol %	C (max) C (min)	Voltage Range					
					V <sub>1</sub> Volts	V <sub>2</sub> Volts				
							Volts		GHz	Watts
1N5704A	1N5470A	33	10	3.2	2.0	60	65	350	0.05	0.4
1N5704B	1N5470B	33	5.0	3.2	2.0	60	65	350	0.05	0.4
1N5705	1N5471A	39	20	3.2	2.0	60	65	325	0.05	0.4
1N5705A	1N5471A	39	10	3.2	2.0	60	65	325	0.05	0.4
1N5705B	1N5471B	39	5.0	3.2	2.0	60	65	325	0.05	0.4
1N5706	1N5472A	47	20	3.2	2.0	60	65	300	0.05	0.4
1N5706A	1N5472A	47	10	3.2	2.0	60	65	300	0.05	0.4
1N5706B	1N5472B	47	5.0	3.2	2.0	60	65	300	0.05	0.4
1N5707	1N5473A	56	20	3.2	2.0	60	65	225	0.05	0.4
1N5707A	1N5473A	56	10	3.2	2.0	60	65	225	0.05	0.4
1N5707B	1N5473B	56	5.0	3.2	2.0	60	65	225	0.05	0.4
1N5708	1N5474A	68	20	3.2	2.0	60	65	175	0.05	0.4
1N5708A	1N5474A	68	10	3.2	2.0	60	65	175	0.05	0.4
1N5708B	1N5474B	68	5.0	3.2	2.0	60	65	175	0.05	0.4
1N5709	1N5475A	82	20	3.2	2.0	60	65	150	0.05	0.4
1N5709A	1N5475A	82	10	3.2	2.0	60	65	150	0.05	0.4
1N5709B	1N5475B	82	5.0	3.2	2.0	60	65	150	0.05	0.4
1N5710	1N5476A	100	20	3.2	2.0	60	65	150	0.05	0.4
1N5710A	1N5476A	100	10	3.2	2.0	60	65	150	0.05	0.4
1N5710B	1N5476B	100	5.0	3.2	2.0	60	65	150	0.05	0.4



# 2N ... 3N ... & 4N JEDEC REGISTERED DEVICES

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## NUMERICAL INDEX

The following table provides a numerical index and short-form specifications for EIA-registered 2N, 3N and 4N type numbers.

### KEY

TYPE	MATERIAL POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS					
					$P_D$ @ 25°C	$T_J$ Ref Point °C	$V_{CBO}$ (volts)	$V_{CE} -$ (volts) Subscript	$h_{FE}$ @ $I_C$ (min) (max) Units	$V_{CE(SAT)}$ @ $I_C$ (volts) Units	$h_{r-}$ Subscript	$f_{-}$ Units Subscript		
Numerical Listing of 2N and 3N Registered Type Numbers					Common-Emitter DC Short-Circuit Forward-Current Transfer Ratio at Specified Collector Current									
S = Silicon G = Germanium					$I_C$ Units: A = Amp M = milliamp * = microamp N = nanoamp									
P = PNP N = NPN					Maximum Collector-Emitter Voltage (Subscript Identifies Condition)									
Type number of recommended replacement or of nearest electrical equivalent fully characterized in this book					Subscript: O = $V_{CEO}$ = Base Open R = $V_{CER}$ = Specified Resistance S = $V_{CES}$ = Base Shorted V = $V_{CEV}$ = Used when only voltage bias is used X = $V_{CEX}$ = Base-Emitter Back Biased U = $V_{CE}$ = Termination Undefined									
Reference device number indicates specific Data Sheet on which device is characterized					Small-Signal Forward-Current Transfer Ratio (E, B or C defines the parameter) _____ E = $h_{fe}$ = Common-Emitter Current Transfer Ratio B = $h_{fb}$ = Common-Base Current Transfer Ratio C = $h_{fc}$ = Common-Collector Current Transfer Ratio									
APPLICATION CODE A = Amplifier AH = Amplifier, High frequency AHP = Amplifier, High frequency power AL = Amplifier, Light sensitive AM = Amplifier, Multiple device AP = Amplifier, Power RD = Radiation Detector S = Switch SC = Switch, Chopper SH = Switch, High speed SHP = Switch, High speed power SP = Switch, Power					CUTOFF FREQUENCY Units: K = KHz M = MHz G = GHz (B, E, M or T Indicate the Parameter) _____ B = $f_{hb}$ = $f_{ab}$ = Common-Base Cutoff Frequency E = $f_{he}$ = $f_{ae}$ = Common-Emitter Cutoff Frequency M = $f_{max}$ = Maximum Frequency of Oscillations T = $f_r$ = Current Gain - Bandwidth Product									
Power Dissipation at 25°C Units: M = milliwatts W = Watts					Maximum Collector - Base Voltage									
Ref. Point: A, C, J, S, Indicates Ambient, Case, Junction or Stud					Maximum Operating Junction Temperature									



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	Units	h <sub>FE</sub> —	Subscript	f <sub>T</sub>	Units
2N21		P			S	0.12W	A	85	100											
2N22	G	P			S	145M	A	55	100	100	O						2.0	B		
2N23	G	P			S	105M	A	55	40	50	O						2.0	B		
2N24	G	P			A	145M	A	50	30	30	O						2.2	B		
2N25	G	P			AH	200M	A	60	50	50	O						2.5	B	3.0M	B
2N26	G	P			S	90M	A	55	30	40	O									
2N27	G	P			A	50M	A	85	35								0.95	B	1.0M	B
2N28		N			A	50M	A	85	30								0.94	B	0.5M	B
2N29		N			A	50M	A	85	35								0.96	B	1.0M	B
2N30	G	P			A	100M	A	40	35										3.0M	B
2N31	G	P			A	100M	A	40	35										3.0M	B
2N32	G	P			S	50M	A		40											
2N32A	G	P			S	50M	A		40											
2N33	G	P	2N1191	2N1191	AH	30M	A		8.5											
2N34	G	P			A	50M	A		25											
2N34A	G	P			A	50M	A		25											
2N35	G	P			A	50M	A		25											
2N35A	G	N			A															
2N36	G	P	2N1191	2N1191	A	50M	A	50	20								30	E		
2N37	G	P	2N1191	2N1191	A	50M	A	20									15	E		
2N38	G	P	2N1191	2N1191	A	50M	A	20												
2N38A	G	P			A	50M	A		20	20										
2N41	G	P			A	50M	A		25											
2N43	G	P			A	240M	A	85	45	30	O	34	65	20M			30	E	500K	B
2N43A	G	P	2N525	2N524	A	240M	A	85	45	30	O	34	43	20M			30	E	500K	B
2N44	G	P	2N524	2N524	A	240M	A	85	45	30	O	18		20M					500K	B
2N45	G	P	2N524	2N524	A	240M	A	85	45	30	O			20M					500K	B
2N46	G	P			A	50M	A		25											
2N47	G	P	2N1191	2N1191	A	50M	A		35											
2N48	G	P			A	50M	A		35											
2N49	G	P	2N1191	2N1191	A	50M	A		35											
2N50	G	P			S	50M	A	50	15											
2N51	G	P			S	0.1W	A	50	50											
2N52	G	P			S	0.12W	A	50	50											
2N53	G	P			S	0.1W	A	50	50											
2N54	G	P	2N1191	2N1191	A	0.2W	A	60	45											
2N55	G	P	2N1191	2N1191	A	0.2W	A	60	45											
2N56	G	P	2N1191	2N1191	A	0.2W	A	60	45											
2N57	G	P			AP	20W	C		60											
2N59	G	P	2N1193	2N1191	A	180M	A	85	25	25	O									
2N59A	G	P	2N1193	2N1191	A	180M	A	85	40	40	O									
2N59B	G	P	2N1193	2N1191	A	180M	A	85	50	50	O									
2N59C	G	P	2N1193	2N1191	A	180M	A	85	60	60	O									
2N60	G	P	2N1193	2N1191	A	180M	A	85	25	25	O									
2N60A	G	P	2N1193	2N1191	A	180M	A	85	40	40	O									
2N60B	G	P	2N1193	2N1191	A	180M	A	85	30	50	O									
2N60C	G	P	2N1193	2N1191	A	180M	A	85	60	60	O									
2N61	G	P	2N1192	2N1191	A	180M	A	85	25	25	O									
2N61A	G	P	2N1191	2N1191	A	180M	A	85	40	40	O									
2N61B	G	P	2N1191	2N1191	A	180M	A	85	50	50	O									
2N61C	G	P	2N1191	2N1191	A	180M	A	85	60	60	O									
2N62	G	P	2N1191	2N1191	A	50M	A		35											
2N63	G	P	2N1191	2N1191	A	102M	A	85	44	44	S									
2N64	G	P	2N1191	2N1191	A	102M	A	85	30	30	S									
2N65	G	P	2N1193	2N1191	A		A	85	24	24	S									
2N66	G	P			AP	27.5W	C	80	60	40										
2N67	G	P			S	0.1W	A	85	50											
2N68	G	P			AP	2.0W	A	70	25											
2N71	G	P			AP	1.0W	A	60	75											
2N72	G	P			S	50M	A		40	50	U									
2N73		P			SC	0.2W	A			50	U									
2N74		P			S	0.2W	A			50	U									
2N75		P			S	0.2W	A			20	U									
2N76	G	P	2N319	2N319	A	5.0M	J	60	20										500K	B
2N77	G	P	2N1191	2N1191	A	35M	A		25											
2N78	G	N			AH	65M	A	85	15	15	O	45	135	1.0M			0.97	B	5.0M	B
2N78A	G	N			AH	65M	A	85	20	15	O	45	135	1.0M			0.97	B	5.0M	B
2N79	G	P	2N1191	2N1191	A	35M	A		35											
2N80	G	P			A	50M	A		25											
2N81	G	P	2N1191	2N1191	A	50M	A	100		20	O						20	E		
2N82	G	P	2N1191	2N1191	A	35M	A	71				20	60	1.0M						
2N94	G	N			AH	150M	A	85	20	20	R	20	80	1.0M			7.5		2.0M	B
2N94A	G	N			AH	150M	A	85	20	20	R	20	80	1.0M						
2N95	G	P			AP	2.5W	A	70	25								5.0		5.0M	B
2N96	G	P			A	50M	A		30											
2N97	G	N			A	50M	A	75	30								5.0	E	0.5M	B
2N97A	G	N			A	50M	A	85	40								5.0	E	0.5M	B
2N98	G	N			A	50M	A	75	40								19	E	0.8M	B
2N98A	G	N			A	50M	A	85	40								24	E	0.8M	B
2N99	G	N			A	50M	A	75	40								19	E	2.0M	B
2N100	G	N			A	25M	A	50	25								99	E	2.5M	B
2N101	G	P			AP	1.0W	A	70	25											
2N102	G	N			AP	1.0W	A	70	25											
2N103	G	P			A	50M	A	75	35											
2N104	G	P	2N650	2N650	A	150M	A	70	30								1.5	E		
2N105	G	P			A	35M	A	50	35											
2N106	G	P	2N1191	2N1191	A	102M	A	85	6.0											
2N107	G	P	2N464	2N464	A	50M	A	60	12	6.0	O						0.95	B		



## 2N108-1N184

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	Subscript	(min)	(max)	Units	(volts)	Units	h <sub>FE</sub>	Subscript	Units	Subscript	
2N108	G	P	2N1192	2N1191	A	50M	A	71	35	25	O	65	115	50M	0.15	50	E			
2N109	G	P			A	165M	A	85	50						2.5	18M				
2N110	G	P			S	150M	A	85	30	15	O	15		1.0M						
2N111	G	P			AH	150M	A	85	30	15	O	15		1.0M						
2N111A	G	P			AH	150M	A	85	30	15	O	15		1.0M						
2N112	G	P			AH	150M	A	85	30	15	O	15		1.0M						
2N112A	G	P			AH	150M	A	85	30	15	O	15		1.0M						
2N113	G	P			AH	96M	A	85	10											
2N114	G	P			AH	96M	A	85	10											
2N115	G	P			SP	50W	C	75	32	32	R		110	30M			0.9	B	1.0M	
2N117	S	N			SH	150M	C	150	30						0.95	B	2.0M			
2N118	S	N			SH	150M	C	150	30											
2N118A	S	N			SH	150M	C	150	45											
2N119	S	N			SH	150M	C	150	30			76	333			0.974	B	2.0M		
2N120	S	N			AP	8.75W	C	150	120			3.0		100M			0.987	B		
2N122	S	N			SH	50M	J	85	20	15	O					0.98	B	5.0M		
2N123	G	P			S	50M	A	75	10			12	24	5.0M	0.3	5.0M		0.3M		
2N124	G	N			S	50M	A	75	10			24	48	5.0M	0.3	5.0M		5.0M		
2N125	G	N			S	50M	A	75	10			48	100	5.0M	0.3	5.0M		5.0M		
2N126	G	N			S	50M	A	75	10			100	200	5.0M	0.3	5.0M		5.0M		
2N127	G	N			S	50M	A	75	10											
2N128	G	P			AH	30M	A	85	10	4.5	U					19	E	45M		
2N129	G	P			AH	30M	A	85	10	4.5	U					11.5	E	30M		
2N130	G	P	2N1191	2N1191	A	85M	A	85	44											
2N130A	G	P	2N650	2N650	A	100M	A	85	45	40	O					14	E			
2N131	G	P	2N1192	2N1191	A	85M	A	85	30											
2N131A	G	P	2N651	2N650	A	100M	A	85	45	30	O					27	E			
2N132	G	P	2N1192	2N1191	A	85M	A	85	24											
2N132A	G	P	2N651	2N650	A	100M	A	85	35	20	O									
2N133	G	P	2N1192	2N1191	A	85M	A	85	30											
2N133A	G	P	2N651	2N650	A	100M	A	85	35	20	O									
2N135	G	P			AH	100M	A	85	20	12	R					20	E	4.5M		
2N136	G	P			AH	100M	A	85	20	12	R					40	E	6.5M		
2N137	G	P			AH	100M	A	85	10	6.0	R					60	E	10M		
2N138	G	P			A	50M	A	50	24											
2N138A	G	P			A	150M	A	85	45	30	O	10		50M						
2N138B	C	P			A	100M	A	85	45											
2N139	G	P			A	80M	A	70	16											
2N140	C	P			A	80M	A	70	16											
2N141	G	P			AP	1.5W	A	25	60	30										
2N142	G	N			AP	1.5W	A	25	60	30										
2N143	G	P			AP	1.0W	A	25	60	30										
2N144	G	N			AP	1.0W	A	25	60	30										
2N145	G	N			AH	65M	A	75	20	20	U									
2N146	G	N			AH	65M	A	75	20	20	U									
2N147	G	N			AH	65M	A	75	20	20	U									
2N148	G	N			AH	65M	A	75	16	16	U									
2N148A	G	N			AH	65M	A	75	32	32	U									
2N149	G	N			AH	65M	A	75	16	16	U									
2N149A	G	N			AH	65M	A	75	16	16	U									
2N150	G	N			AH	65M	A	75	16	16	U									
2N150A	G	N			AH	65M	A	75	16	16	U									
2N155	G	P	2N176	2N176	AP	1.5W	A	85	30			24		0.5A	0.65	0.5A		145K		
2N156	G	P	2N176	2N176	AP	1.5W	A	85	30			24		0.5A	0.6	1.0A		100K		
2N157	G	P	2N1531	2N1529	AP	1.5W	A	85	60			20		0.5A				100K		
2N157A	G	P	2N1532	2N1529	AP	1.5W	A	85	90			20		0.5A				100K		
2N158	G	P	2N2139	2N2137	AP	1.5W	A	85	60			21		0.5A	0.75	1.0A		145K		
2N158A	G	P	2N2141	2N2137	AP	1.5W	A	95	80	60	O	21		0.5A	0.75	1.0A		4.0K		
2N160	S	N	2N2217		A	0.15W	A		40			9.0	19							
2N160A	S	N	2N2217		A	0.15W	A		40			9.0	19							
2N161	S	N	2N2217		A	0.15W	A		40			19	39							
2N161A	S	N	2N2217		A	0.15W	A		40			19	39							
2N162	S	N	2N2221	2N2218	A	0.15W	A		40			19	199							
2N162A	S	N	2N2221	2N2218	A	0.15W	A		40			19	199							
2N163	S	N	2N2221	2N2218	A	0.15W	A		40			39	199							
2N163A	S	N	2N2221	2N2218	A	0.15W	A		40			39	199							
2N166	G	N			AH	25M	A	50		6.0	O					0.952	B	5.0M		
2N167	G	N			AH	75M	A	85	30	30	O					0.952	B	5.0M		
2N167A	G	N			SH	75M	A	85	30	30	O	17	90	8.0M		20	E			
2N168	G	N			AH	55M	A	75	15	15	O					20	E			
2N168A	G	N			AH	65M	A	85	15	15	O					20	E			
2N169	G	N			AH	65M	A	85	15	15	O					30	E			
2N169A	G	N			A	65M	A	85	25	25	O					30	E			
2N170	G	N			AH	25M	A	50		6.0	O									
2N172	G	N			AH	65M	A	75		16	U									
2N173	G	P			AP	10W	C	95	60	50	S	35	70	5.0A	1.0	12A				
2N174	G	P			SP	100W	C	95	80	70	S	25	50	5.0A	0.9	12A				
2N174A	G	P			SP	100W	C	95	80	70	S	40	80	1.2A	0.7	12A		100K		
2N175	G	P	2N1192	2N1191	AH	50M	A	71	10											
2N176	G	P			AH	90W	C	80	40	30	R	25	15	0.5A	0.4	3.0A		4.0K		
2N178	G	P			A	40W	C	90	30	30	R	15	45	0.5A	0.6	3.0A		5.0K		
2N179	G	P	2N176	2N176	A															
2N180	G	P	2N1192	2N1191	A	0.15W	A	75	30											
2N181	G	P	2N1192	2N1191	A	0.25W	A	75	30											
2N182	G	N			S	0.1W	A	75	25											
2N183	G	N			S	0.1W	A	75	25											
2N184	G	N			S	0.1W	A	75	25											



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript			
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)	Units	Units	Units	Units	Units	Units
2N185	G	P	2N650	2N650	A	150M	50	20	25	R				35	E					
2N186	G	P	2N1191	2N1191	A	100M	85	25	25	R										
2N187	G	P	2N1191	2N1191	A	200M	85	25	25	R										
2N187A	G	P	2N1191	2N1191	A	200M	85	25	25	R										
2N188	G	P	2N1191	2N1191	A	100M	85	25	25	R										
2N188A	G	P	2N1191	2N1191	A	200M	85	25	25	R										
2N189	G	P	2N1191	2N1191	A	75M	85	25	25	R										
2N190	G	P	2N1191	2N1191	A	75M	85	25	25	R										
2N191	G	P	2N1192	2N1191	A	75M	85	25	25	R										
2N192	G	P	2N1193	2N1191	A	75M	85	25	25	R										
2N193	G	N			AH	150M	85	18	18	R				4.0						
2N194	G	N			AH	50M	75	15	15	R				4.8						
2N194A	G	N			AH	50M	75	20	20	R				5.0						
2N206	G	P			A	75M		30												
2N207	G	P	2N1191	2N1191	A	50M	65	12	12	V				35	E					
2N207A	G	P	2N1193	2N1191	A	50M	65	12	12	V				35	E					
2N207B	G	P	2N1190	2N1189	A	50M	65	12	12	V				35	E					
2N211	G	N			AH	50M	75	10	10	R				3.8						
2N212	G	N			AH	150M	85	18	18	R	10	1.0M	0.6	100M						
2N213	G	N			A	50M	75	40	25	R			1.0	100M						
2N213A	G	N			A	150M	85	40	25	R										
2N214	G	N			A	125M	75	40	30		50	100	35M	100						
2N215	G	P	2N1189	2N1189	A	150M	70	30												
2N216	G	N			AH	50M	75	15	15					3.9						
2N217	G	P	2N1192	2N1191	A	150M	71	35	25	O	65	115	50M	0.15	50M					
2N218	G	P			A	80M	70	16												
2N219	G	P			A	80M	70	16												
2N220	G	P	2N1189	2N1189	A	50M	71	10												
2N223	G	P	2N1193	2N1191	A	100M	65		18	V				39						
2N224	G	P	2N1192	2N1191	A	250M	75	25			60	120	100M	0.25	100M					
2N225	G	P	2N1193	2N1191	A	250M	75	25			60	120	100M	0.25	100M					
2N226	G	P	2N1192	2N1191	A	250M	75	30			35	105	100M	0.25	100M					
2N227	G	P	2N1192	2N1192	A	250M	75	30			35	105	100M	0.25	100M					
2N228	G	P			A	50M	75	25			50	100	35M							
2N229	G	N			A	50M	75	10												
2N230	G	P			AP	15W	85	60	30	U	60	106	0.5A	0.8	2.0A					
2N231	G	P			AH	9.0M	55	4.5	4.5	V										
2N232	G	P			AH	9.0M	55	4.5	4.5	V										
2N233	G	N			AH	50M	75	10												
2N233A	G	N			AH	50M	75	10												
2N234	G	P	2N554	2N178	AP		90		25	R										
2N234A	G	P	2N555	2N178	AP	25W	C	90	25	R										
2N235	G	P	2N350A	2N350A	AP		90		40	U			0.8	1.0A						
2N235A	G	P			AP	25W	C	90	40	U			0.8	1.0A						
2N235B	G	P			AP	25W	C	85	35	R			0.8	1.0A						
2N236	G	P	2N350A	2N350A	AP		95		35	R			1.0	3.0A						
2N236A	G	P	2N351A	2N350A	AP	25W	C	95	35	R			1.0	3.0A						
2N236B	G	P	2N376A	2N350A	AP	25W		50	35	R			1.0	3.0A						
2N237	G	P			A	150M	85	45												
2N238	G	P	2N1192	2N1191	A	50M	60	20					0.1	8.0M						
2N240	G	P			S	25M	85	6.0	6.0	S										
2N241	G	P	2N321	2N319	A	100M	85	25	25	R										
2N241A	G	P	2N321	2N319	A	200M	85	25	25	R										
2N242	G	P			A	20W	C	85	45	R										
2N243	S	N			A	750M	C	150	60											
2N244	S	N			A	750M	C	150	60											
2N247	G	P			AH	80M		40												
2N248	G	P			A		75	25												
2N249	G	P			A	350M	A	60	25											
2N250	G	P	2N3611	2N3611	AP	12W	C	80	40											
2N250A	G	P	2N3611	2N2906	AP	90W	C	100	30	V	30	25	100	500M	0.7	3.0A				
2N251	G	P	2N1530	2N1529	AP	12W	C	80	60											
2N251A	G	P	2N3616	2N3615	AP	90W	C	100	60	V	30	25	100	500M	0.7	3.0A				
2N252	G	P			AH	30M	C	55		O										
2N253	G	N			AH	65M	C	75		O										
2N254	G	N			AH	65M	C	75		O										
2N255	G	P			AP	1.5W	A	85	15											
2N255A	G	P			AP	20W	C	85	15	R										
2N256	G	P	2N555	2N554	AP	1.5W	A	85	30											
2N256A	G	P	2N178	2N178	AP	20W	C	85	30	R										
2N257	G	P			AP	25W	C	85	40											
2N258	S	P	2N2906	2N2906	A	250M	A	160	30	O										
2N259	S	P	2N2906	2N2906	A	250M	A	160	30	O										
2N260	S	P	2N2906	2N2906	A	0.2W	A	150	10											
2N260A	S	P	2N2906	2N2906	A	0.2W	A	150	30											
2N261	S	P	2N2906	2N2906	A	0.2W	A	150	75											
2N262	S	P	2N2906	2N2906	A	0.2W	A	150	10											
2N262A	S	P	2N2906	2N2906	A	0.2W	A	150	30											
2N263	S	N	2N2907	2N2907	A	150M	A	150	45	O	45	150	10M	1.5	10M					
2N264	S	N	2N2906	2N2906	A	125M	A	150	45	O	20	55	10M	1.5	10M					
2N265	G	P	2N1175	2N1413	A	75M	A	85	25	R										
2N266	G	P			A	75M	A	85	18	R										
2N267	G	P			AH	80M		40												
2N268	G	P	2N1530	2N1529	AP	25W	C	85	80											
2N268A	G	P			SP	10W	C	90	80											
2N269	G	P			S	120M	A	85	25											
2N270	G	P	2N1193	2N1191	A	150M	A	50	25	O	20		2.0A	1.0	2.0A					



# 2N271-2N341A

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript			
												(min)	(max)						Units	Units	Units
2N271	G	P			AH	150M	A	85	30	10	O										
2N271A	G	P			AH	150M	A	85	30	10	O										
2N272	G	P	2N298A	2N298A	A	150M	A	85	30	24	S					60	E				
2N273	G	P	2N298A	2N298A	A	150M	A	85	45	25	S	30									
2N274	G	P	2N298A	2N298A	AH	120M	A	100	40	40	O	20	50M			20	E				
2N277	G	P			AP	70W	C	95	40	40	S	35	70	1.5M							
2N278	G	P			AP	70W	C	95	50	45	S	35	70	5.0A							
2N279	G	P	2N650	2N650	A	125M	A	75	20	20	R			1.0	12A	20	E				
2N280	G	P	2N650	2N650	A	125M	A	75	20	20	R					30	E				
2N281	G	P	2N651	2N650	A	167M	C	75	16	16	R	45	120					0.35M			B
2N282	G	P	2N651	2N650	A																
2N283	G	P	2N650	2N650	S	125M	A	75	20	20						30	E				
2N284	G	P			S	125M	A	75	32	32		15						0.35M			B
2N284A	G	P			S	125M	A	75	60	60		15						0.35M			B
2N285	G	P	2N285A	2N285A	AP	25W	C	95	35	35	R			0.5	1.0A						
2N285A	G	P			AP	25W	C	95	35	35	R			0.5	1.0A						
2N290	G	P			AP	55W	C	95	70												
2N291	G	P	2N1191	2N1191	A	180M	A	50	25							30	E				
2N292	G	N			AH	65M	A	85	15	15	O	6.0	44								
2N293	G	N			AH	65M	A	85	15	15	O	6.0	55								
2N296	G	P	2N1531	2N1529	A	20W	C	85	60			19		1.0A	1.0	1.0A		4.0K			B
2N297	G	P	2N297A	2N297A	AP	35W	C	95	60	50	S	40	100	0.5A	1.0	2.0A		5.0K			E
2N297A	G	P			AP	35W	C	95	60	50	S	40	100	0.5A	1.0	2.0A		5.0K			E
2N299	G	P			AH	20M	A	85	5.0	4.5	V							90M			M
2N300	G	P			AH	20M	A	85	5.0	4.5	V					11	E	85M			M
2N301	G	P			AP	11W	A	85	40												
2N301A	G	P			AP	11W	A	85	60												
2N302	G	P			AH	150M	A	85	30	10	O					45	E	7.0M			B
2N303	G	P			AH	150M	A	85	30	10	O					75	E	14M			B
2N306	G	N			A	50M	A	75	20	15	R			0.5	0.1A	25	E	0.6M			B
2N307	G	P			AP	25W	C	75	35	35	R	20		1.0	0.2A			3.0K			B
2N307A	G	P	2N307A	2N307A	AP	25W	C	75	35	35	R	20		0.8	1.0A			3.5K			E
2N308	G	P			AH	30M	A	55	20	20	O										
2N309	G	P			AH	30M	A	55	20	20	O										
2N310	G	P			AH	30M	A	55	30	30	O										
2N311	G	P			SP	75M	A	85	15	15	O	25	75	10M	0.075	10M					
2N312	G	N			S	100M	A	85	20	15	O	15	30	100M	0.15	100M					
2N315	G	P			S	150M	A	100	30	20	O	20	50	100M	0.15	100M					
2N315A	G	P			S	150M	A	100	30	20	O	20	50	100M	0.15	100M					
2N315B	G	P			S	150M	A	100	30	20	O	20	50	100M	0.15	100M					
2N316	G	P			S	100M	A	85	20	10	O	20	50	200M	0.18	200M					
2N316A	G	P			S	150M	A	100	30	15	O	20	50	200M	0.18	200M					
2N317	G	P			S	100M	A	85	20	6.0	O	20	60	400M	0.2	400M					
2N317A	G	P			S	150M	A	100	25	10	O	20	60	400M	0.2	400M					
2N318	G	P			AL	50M	A														
2N319	G	P			A	225M	A	85		20	R										
2N320	G	P			A	225M	A	85		20	R										
2N321	G	P			A	225M	A	85		20	R										
2N322	G	P			A	140M	A	60	18	18	R	34	65	20M				1.0M			B
2N323	G	P			A	140M	A	60	18	18	R	53	125	20M				1.5M			B
2N324	G	P			A	140M	A	60	18	18	R	72	198	20M				2.0M			B
2N325	G	P	2N3611	2N3611	A	12W	C	85	35	35	S	30	60	500M	0.6	500M		150K			B
2N326	G	N			A	7.0W	C	85	35	35	S	30	60	500M	0.6	500M		150K			B
2N327	S	P	2N2906	2N2904	A	350M	A	160	50	40	O						9.0	E			
2N327A	S	P	2N2906	2N2904	AM	385M	A	160	50	40	O	9.0	22	3.0M	0.3	5.0M					
2N327B	S	P	2N2906	2N2904	AM	385M	A	200	50	40	O	9.0	22	3.0M	0.3	5.0M					
2N328	S	P			A	350M	A	160	35												
2N328A	S	P			AM	385M	A	160	50	35	O	18	44	3.0M	0.5	10M					
2N328B	S	P			AM	385M	A	200	50	35	O	18	44	3.0M	0.5	10M					
2N329	S	P			A	350M	A	160	30								36	E			
2N329A	S	P			AM	385M	A	160	50	30	O	36	88	3.0M	0.6	15M					
2N329B	S	P			AM	385M	A	200	50	30	O	36	88	3.0M	0.6	15M					
2N330	S	P			A	350M	A	160	45												
2N330A	S	P	2N2906	2N2904	AM	385M	A	160	50	30	O										
2N331	G	P			A	200M	A	71	30												
2N332	S	N	2N2221	2N2218	AH	150M	A	175	45			9.0	20								
2N332A	S	N	2N2218	2N2218	A	500M	A	175	45	45	O			1.0	5.0M	0.9	B	2.5M			B
2N333	S	N	2N2221	2N2218	AH	150M	A	175	45			18	40			0.948	B				
2N333A	S	N	2N2218	2N2218	A	500M	A	175	45	45	O			1.0	5.0M	0.948	B	2.5M			B
2N334	S	N	2N2221	2N2218	AH	150M	A	175	45			18	86			0.948	B				
2N334A	S	N	2N2218	2N2218	A	500M	A	175	45	45	O			1.0	5.0M	0.948	B	8.0M			B
2N334B	S	N	2N2218	2N2218	A	500M	A	175	60	60	O	15	85	1.0M	1.0	5.0M	18	E	8.0M		
2N335	S	N	2N2221	2N2218	AH	150M	A	175	45			36	86			0.973	B				
2N335A	S	N	2N2218	2N2218	A	500M	A	175	45	45	O			1.0	5.0M	0.973	B	2.5M			B
2N335B	S	N	2N2218	2N2218	A	500M	A	175	60	60	O	28	90	1.0M	1.0	5.0M	37	E	2.5M		
2N336	S	N	2N2221	2N2218	AH	150M	A	175	45			76	333			0.987	B				
2N336A	S	N	2N2218	2N2218	A	500M	A	175	45	45	O			1.0	5.0M	0.987	B	2.5M			B
2N337	S	N	2N2221	2N2218	S	125M	C	150	45			20	55	10M				10M			B
2N337A	S	N	2N2218	2N2218	A	500M	A	175	45			20	55	10M			19	E	15M		B
2N338	S	N	2N2221	2N2218	S	125M	C	150	45			45	150	10M				20M			B
2N338A	S	N	2N2218	2N2218	A	500M	A	175	45			45	150	10M			39	E	25M		B
2N339	S	N			A																



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript				
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)		@ I <sub>C</sub>		Units	Units		
2N342	S	N			A	1.0W	C	150	60	60	O										
2N342A	S	N			A	1.0W	C	150	85	85	O							0.9	B		
2N342B	S	N			A	750M	C	175	85	85	O							0.9	B		
2N343	S	N			A	1.0W	C	150	60	60	O							9.0	B		
2N343A	S	N			A	1.0W	C	150	60	60	O							0.966	B		
2N343B	S	N			A	750M	C	175	65	65	O							0.966	B		
2N344	G	P			AH	20M	A	55	5.0	5.0	O							28	E		
2N345	G	P			AH	20M	A	55	5.0	5.0	V							11	E		
2N346	G	P			AH	20M	A	55	5.0	5.0	V							25	E		
2N350	G	P		2N350	AP	10W	A	100	50	40	O	20	60	700M				10	E		
2N350A	G	P		2N350	AP	90W	J	100	50	40	S	20	60	0.7A	1.75	3.0A					
2N351	G	P		2N351A	AP	10W	A	100	50	40	S	25	90	700M							
2N351A	G	P	2N1536	2N350A	AP	90W	J	100	50	40	S	25	90	0.7A	1.75	4.0A				5.0K	E
2N352	G	P	2N1536	2N1529	AP	25W	C	100	40	40	R	30	140	1.0A					10K	E	
2N353	G	P	2N1536	2N1529	AP	30W	C	100	40	40	R	40	150	1.0A					7.0K	E	
2N354	S	P	2N2906	2N2904	AH	150M	A	140	25	25	U							9.0	E		
2N355	S	P	2N2906	2N2904	S	150M	A	140	10	10	U							9.0	E		
2N356	G	N			S	100M	A	85	20	18	O	20	50	100M	0.15	5.0M					
2N356A	G	N			S	150M	A	100	30	20	O	20	50	100M	0.2	100M					
2N357	G	N			S	100M	A	85	20	15	O	20	50	200M	0.2	200M					
2N357A	G	N			S	150M	A	100	30	20	O	25	75	200M	0.2	200M					
2N358	G	N			S	100M	A	85	20	12	O	20	50	300M	0.2	300M					
2N358A	G	N			S	150M	A	100	30	15	O	25	75	300M	0.2	300M					
2N359	G	P		2N359	A	170M	A	85	25	18	R	100	300	50M							
2N360	G	P	2N1192	2N1191	A	170M	A	85	32	30	R	50	150	50M							
2N361	G	P	2N1191	2N1191	A	170M	A	85	32	30	R	25	75	50M							
2N362	G	P	2N1192	2N1191	A	170M	A	85	25	18	O										
2N363	G	P	2N1192	2N1191	A	170M	A	85	32	28	O										
2N364	G	N			S	150M	A	100	30												
2N365	G	N			S	150M	A	100	30												
2N366	G	N			S	150M	A	100	30												
2N367	G	P	2N1191	2N1191	S	100M	A	75	30												
2N368	G	P	2N1191	2N1191	S	100M	A	75	30												
2N369	G	P	2N1191	2N1191	S	100M	A	75	30												
2N370	G	P	2N3324	2N3323	AH	80M	A	71	24												
2N371	G	P	2N3324	2N3323	AH	80M	A	71	24												
2N372	G	P	2N3324	2N3323	AH	80M	A	71	24												
2N373	G	P			AH	80M	A	71	25												
2N374	G	P	2N3325	2N3323	AH	80M	A	71	25												
2N375	G	P			AP	58W	C	95	80	60	S	35	90	1.0A	1.0	2.0A					
2N376	G	P			AP	10W	A	100	50	40	O	35	120	700M							
2N376A	G	P			AP	90W	J	100	50	40	S	35	120	0.7A	1.75	5.0A					
2N377	G	N			S	150M	A	100	25	20	V	20	60	30M	0.5	200M					
2N377A	G	N			S	150M	A	100	40	40	V	20	60	30M							
2N378	G	P			SP	50W	C	100	20			40	80	2.0A	1.0	2.0A					
2N379	G	P			SP	50W	C	100	40			20	70	2.0A	1.0	2.0A					
2N380	G	P			SP	50W	C	100	30			30	70	2.0A	1.0	2.0A					
2N381	G	P			A	0.2W	A	100	50	25	R	35	65	20M							
2N382	G	P			A	0.2W	A	100	50	25	R	60	95	20M							
2N383	G	P			A	0.2W	A	100	50	25	R	75	120	20M							
2N384	G	P	2N3325	2N3323	AH	120M	A	100	40	40	O	20	175	1.5M							
2N385	G	N			S	150M	A	100	25	25	R	30	110	30M							
2N385A	G	N			S	150M	A	100	40	40	V	30	110	30M							
2N386	G	P			AP	500M	C	100	60	60	V	20		2.5A							
2N387	G	P			AP	500M	C	100	80	80	V	20		2.5A							
2N388	G	N			S	150M	A	100	25	20	R	60	180	30M							
2N388A	G	N			S	150M	A	100	40	40	V	60	200	0.30M							
2N389	S	N	2N5068	2N5068	AP	85W	C	200	60	60	R	12	60	1.0A							
2N389A	S	N	2N5068	2N5068	AP	85W	C	200	60	60	R	12	60	1.0A	0.75	1.0A					
2N392	G	P	2N1550	2N1539	AP	48W	C	95	60	40	R	60	150	3.0A	0.5	3.0A					
2N393	G	P	2N967	2N960	S	25M	A	100	6.0	6.0	S	20		50M	0.07	8.0M					
2N394	G	P			SH	150M	A	85	10	10	O	20		10M							
2N394A	G	P			SH	150M	A	85	10	30	O	30	120	10M							
2N395	G	P			SH	200M	A	100	30	15	R	20	150	10M	0.2	50M					
2N396	G	P			SH	200M	A	100	30	20	R	30	150	10M	0.2	50M					
2N396A	G	P			SH	200M	A	100	30	20	O	30	150	10M	0.2	50M					
2N397	G	P			SH	200M	A	100	30	15	R	40	150	10M	0.2	50M					
2N398	G	P			SP	50M	A	55	105	105	S	20		5.0M							
2N398A	G	P			A	150M	A	100	105	105	S	20		5.0M	0.35	5.0M					
2N398B	G	P	2N2043	2N2042	SP	250M	A	100	105	105	S	20		5.0M	0.25	5.0M					
2N399	G	P	2N351A	2N350A	AP	25W	C	90	35	35	R				1.0	1.2A					
2N400	G	P	2N350A	2N350A	AP	35W	C	95	25	20	O	40	300	0.5A	0.8	1.0A					
2N401	G	P	2N3611	2N3611	AP	25W	C	90	25	35	R				1.0	1.2A					
2N402	G	P	2N1191	2N1191	A	180M	A	85	25	20	O										
2N403	G	P	2N1191	2N1191	A	180M	A	85	25	20	O										
2N404	G	P			S	150M	A	85	25												
2N404A	G	P			S	150M	A	100	40	35	O	30		12M	0.15	12M					
2N405	G	P	2N322	2N322	A	150M	A	71	20												
2N406	G	P	2N322	2N322	A	150M	A	71	20												
2N407	G	P	2N324	2N322	A	150M	A	71	20												
2N408	G	P	2N324	2N322	A	150M	A	71	20												
2N409	G	P			AH	80M	A	71	13												
2N410	G	P			AH	80M	A	71	13												
2N411	G	P			AH	80M	A	71	13												
2N412	G	P			AH	80M	A	71	13												
2N413	G	P			AH	150M	A	85	30	18</											



2N414A-2N487

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CE</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript		
2N414A	G	P			AH	150M	A	85	30	15	0										
2N414B	G	P			AH	0.2W	A	100	30	24	V					40	E	4.0M	B		
2N414C	G	P			AH	0.2W	A	100	30	24	V					40	E	4.0M	B		
2N415	G	P			AH	150M	A	85	30	10	0										
2N415A	G	P			AH	150M	A	85	30	10	0										
2N416	G	P			AH	150M	A	85	30	12	0										
2N417	G	P			AH	150M	A	85	30	10	0										
2N418	G	P	2N1537	2N1529	SP	25W	C	100	100	75	R	40	4.0A	2.0	4.0A						
2N419	G	P	2N1535	2N1529	SP	35W	C	95	25	20	0	50	0.5A	0.8	1.5A	25	E	3.0K	E		
2N420	G	P	2N1537	2N1529	SP	25W	C	100	65	40	R	40	4.0A	2.0	4.0A						
2N420A	G	P	2N1537	2N1529	SP	25W	C	100	90	65	R	40	4.0A	2.0	4.0A						
2N422	G	P	2N651	2N650	A	150M	A	85	35	20	0										
2N422A	G	P	2N5069	2N5069	A	175M	A	100	35	20	0					30	E	1.5M	B		
2N424	S	N	2N5069	2N5069	AP	85W	C	200	80	R	12	60	1.0A	0.75	1.0A			1.0M	T		
2N424A	S	N			AP	85W	C	200	80	R	12	60	1.0A	0.32	100M			2.5M	B		
2N425	G	P			S	175M	A	85	30	20	0	20	40	0.32	100M			3.0M	B		
2N426	G	P			S	175M	A	85	30	10	0	30	60	0.32	100M			5.0M	B		
2N427	G	P			S	175M	A	85	30	15	0	40	80	0.32	150M			10M	B		
2N428	G	P			S	175M	A	85	30	12	0	60		0.32	200M			10M	B		
2N428A	G	P			S	0.15W	A	100	30	18	0	80		0.32	0.2A			10M	B		
2N438	G	N			S	0.1W	A	85	30	25	0	20	50M					2.5M	B		
2N438A	G	N			S	0.15W	A	85	30	25	0	20	50M					2.5M	B		
2N439	G	N			S	0.1W	A	85	30	20	0	30	50M					5.0M	B		
2N439A	G	N			S	0.15W	A	85	30	20	0	30	50M					5.0M	B		
2N440	G	N			S	0.1W	A	85	30	15	0	40	50M					10M	B		
2N440A	G	N			S	0.15W	A	85	30	15	0	40	50M			50M		10M	B		
2N441	G	P		2N441	AP	50W	C	95	40	40	S	20	40	5.0A							
2N442	G	P		2N441	AP	50W	C	95	50	45	S	20	40	5.0A							
2N443	G	P		2N441	AP	50W	C	95	60	50	S	20	40	5.0A	1.0	12A					
2N444	G	N			A	100M	A	85	15	15	0							0.5M	B		
2N444A	G	N			A	150M	A	100	40	25	0	20	40	20M			15	E	0.5M	B	
2N445	G	N			A	100M	A	85	15	12	0							0.5M	B		
2N445A	G	N			A	150M	A	100	30	18	0	40	160	20M			35	E	2.0M	B	
2N446	G	N			S	100M	A	85	15	10	0							5.0M	B		
2N446A	G	N			S	150M	A	100	30	15	0	60	250	20M			60	E	5.0M	B	
2N447	G	N			S	100M	A	85	15	6.0	0							5.0M	B		
2N447A	G	N			S	150M	A	100	30	12	0	80	300	20M			85	E	9.0M	B	
2N447B	G	N			S	150M	A	100	25	12	0	80	300	20M			150	E	9.0M	B	
2N448	G	N			AH	65M	A	85	15	15	0	8.0	51	1.0M							
2N449	G	N			AH	65M	A	85	15	15	0	34		1.0M							
2N450	G	P			SH	150M	A	85	20	12	0	30		10M				5.0M	B		
2N456	G	P	2N456A	2N456A	AP	50W	C	95	40	40	X			0.2	10M						
2N456A	G	P			AP	150W	C	100	40	40	0	30	90	5.0A	0.5	5.0A			4.0K	E	
2N456B	G	P			AP	150W	C	100	40	30	0	30	90	5.0A	0.5	5.0A			200K	T	
2N457	G	P			AP	50W	C	95	60	60	X			1.0	5.0A						
2N457A	G	P			AP	150W	C	100	60	60	0	30	90	5.0A	0.5	5.0A			4.0K	E	
2N457B	G	P			AP	150W	C	100	60	40	0	30	90	5.0A	0.5	5.0A			200K	T	
2N458	G	P			AP	50W	C	95	80	80	X			1.0	5.0A						
2N458A	G	P		2N456A	AP	150W	C	100	80	80	0	30	90	5.0A	0.5	5.0A			4.0K	E	
2N458B	G	P			AP	150W	C	100	80	45	0	30	90	5.0A	0.5	5.0A			200K	T	
2N459	G	P		2N376A	SP	50W	C	100	60			20	70	2.0A	1.0	2.0A			5.0K	E	
2N459A	G	P		2N376A	SP	106W	C	110	105	60	0	40	70	2.0A	0.3	2.0A			5.0K	E	
2N460	G	P		2N460	A	0.2W	A	100	45			16	32								
2N461	G	P		2N460	A	0.2W	A	100	45			32	100								
2N462	G	P			S	150M	A	75	40			20		200M				500K	B		
2N463	G	P	2N1551	2N1539	AP	37.5W	C	100	60	60	0		60	2.0A				4.0K	E		
2N464	G	P		2N464	A	150M	A	85	45	40	0										
2N465	G	P		2N464	A	150M	A	85	45	30	0										
2N466	G	P		2N464	A	150M	A	85	35	20	0										
2N467	G	P		2N464	A	150M	A	85	35	15	0										
2N469	G	P			AL	50M	A	75	6.0			10		1.0M							
2N469A	G	P			AL	50M	A	85	20												
2N470	S	N	2N2221	2N2218	AH	0.2W	A	200	15	15	0			1.5	5.0M	30	E	8.0M	T		
2N471	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0			1.5	5.0M	10	E	8.0M	T		
2N471A	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0			1.0	5.0M	10	E	8.0M	T		
2N472	S	N	2N2221	2N2218	AH	0.2W	A	200	45	45	0			1.5	5.0M	10	E	8.0M	T		
2N472A	S	N	2N2221	2N2218	A	0.2W	A	200	45	45	0			1.0	5.0M	10	E	8.0M	T		
2N473	S	N	2N2221	2N2218	A	0.2W	A	200	15	15	0			1.5	5.0M	20	E	8.0M	T		
2N474	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0			1.5	5.0M	20	E	8.0M	T		
2N474A	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0	10		1.0	5.0M	20	E	8.0M	T		
2N475	S	N	2N2221	2N2218	A	0.2W	A	200	45	45	0			1.5	5.0M	20	E	8.0M	T		
2N475A	S	N	2N2221	2N2218	A	0.2W	A	200	45	45	0	10		1.0	5.0M	20	E	8.0M	T		
2N476	S	N	2N2221	2N2218	A	0.2W	A	200	15	15	0			1.5	5.0M	30	E	12M	T		
2N477	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0			1.5	5.0M	30	E	12M	T		
2N478	S	N	2N2221	2N2218	AH	0.2W	A	200	15	15	0			1.5	5.0M	40	E	20M	T		
2N479	S	N	2N2221	2N2218	AH	0.2W	A	200	30	30	0			1.5	5.0M	40	E	20M	T		
2N479A	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0	10		1.0	5.0M	40	E	20M	T		
2N480	S	N	2N2221	2N2218	AH	0.2W	A	200	45	45	0			1.5	5.0M	40	E	20M	T		
2N480A	S	N	2N2221	2N2218	A	0.2W	A	200	45	45	0	10		1.0	5.0M	40	E	20M	T		
2N481	G	P			AH	150M	A	85	12	12	0										
2N482	G	P			AH	150M	A	85	12	12	0										
2N483	G	P			AH	150M	A	85	12	12	0										
2N484	G	P			AH	150M	A	85	12	12	0										
2N485	G	P			AH	150M	A	85	12	12	0										
2N486	G	P			AH	150M	A	85	12	12	0										
2N487	G	P			A	100M	A	85	18	18	R	20		1.0M			10	E	10M	T	



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript				
						@ 25°C	°C	(volts)	(volts)	(min)							(max)	Units	Units	Units
2N489 thru 2N494	Unijunction Transistors, see Table on Page 2-88																			
2N495	S	P	2N4238	2N4237	AH	150M	A	140	25	25	U	15	15M	0.15	5.0M	15	E	8.0M	M	
2N496	S	P		A	150M	A	140	10	10	U	12	36	200M			9.0	E	7.2M	T	
2N497	S	N		A	4.0W	C	200	60	60	0	12	36	200M							
2N497A	S	N		A	5.0W	C	200	60	60	0	12	36	200M							
2N498	S	N	2N4239	2N4237	A	4.0W	C	200	100	100	0	12	36	200M						
2N498A	S	N	2N5681	2N5681	A	5.0W	C	200	100	100	0	12	36	200M						
2N499	G	P		2N499	AH	30M	A	85	30	18	0							120M	T	
2N499A	G	P		2N499	AH	60M	A	100	30	18	0					20	E	120M	T	
2N500	G	P	2N3323	2N3323	AH	50M	A	85	20	15										
2N501	G	P	2N3284		SH	60M	A	100	15	12	S	20	10M	0.2	10M			90M	T	
2N501A	G	P			SH	60M	A	100	15	12	S	30	10M	0.2	10M			90M	T	
2N502	G	P			2N499	AH	60M	A	85	20	20	S					9.0	E	220M	T
2N502A	G	P			2N499	AH	75M	A	100	30	30	S					15	E	220M	T
2N502B	G	P			2N499	AH	75M	A	100	30	30	S					20	E	220M	T
2N503	G	P		2N3283	2N3283	AH	25M	A	85	20	20	S					9.0	E	168M	T
2N504	G	P		2N3323	2N3323	AH	30M	A	85	35	25	S	20	200	10M		16	E	50M	T
2N506	G	P				A	50M	A	85	40			25	50	50M	0.6	50M		600K	B
2N507	G	N				A	50M	A	85	40			25	50	50M	0.6	50M		600K	B
2N508	G	P			2N322	A	200M	A	100	18	18	R	99	198	20M				2.5M	B
2N508A	G	P		2N508A	AH	0.2W	A	100	30	30	S	100	200	20M		75	E	2.5M	B	
2N509	G	P			AH	225M	A	100	30							0.96	E	400M	T	
2N511	G	P	2N1554	2N1539	AP	150W	C		40			20	60	10A	0.5	10A		260K	T	
2N511A	G	P	2N1555	2N1539	AP	150W	C		60			20	60	10A	0.5	10A		260K	T	
2N511B	G	P	2N1556	2N1539	SP	150W	C		80			20	60	10A	0.5	10A		260K	T	
2N512	G	P	2N1558	2N1539	AP	150W	C		40			20	60	15A	0.75	15A		260K	T	
2N512A	G	P	2N1559	2N1539	AP	150W	C		60			20	60	15A	0.75	15A		260K	T	
2N512B	G	P	2N1560	2N1539	SP	150W	C		80			20	60	15A	0.5	10A		260K	T	
2N513	G	P	2N1163	2N1162	AP	150W	C		40			20	60	20A	1.25	20A		300K	T	
2N513A	G	P	2N1165	2N1162	AP	150W	C		60			20	60	20A	1.25	20A		260K	T	
2N513B	G	P	2N1167	2N1162	SP	150W	C		80			20	60	20A	0.5	10A		260K	T	
2N514	G	P	2N1163	2N1162	SP	80W	C	95	40	40	X				1.25	25A				
2N514A	G	P	2N1165	2N1162	SP	80W	C	95	60	60	X				1.25	25A				
2N514B	G	P	2N1167	2N1162	SP	80W	C	95	80	80	X				1.25	25A				
2N515	G	N		AH	50M	A	75	20	18	R						4.0	E	2.0M	B	
2N516	G	N		AH	50M	A	75	20	18	R						4.0	E	2.0M	B	
2N517	G	N		AH	50M	A	75	20	18	R						4.0	E	2.0M	B	
2N518	G	P		S	0.15W	A	85	45	12	0	60		10M	0.15	10M		10M			
2N519	G	P		S	100M	A	85	15	15	0						15	E	0.5M	B	
2N519A	G	P		S	150M	A	100	25	18	0	20	50	20M			15	E	0.5M	B	
2N520	G	P		S	100M	A	85	15	12	0						20	E	3.0M	B	
2N520A	G	P		S	150M	A	100	25	15	0	40	170	20M			40	E	2.0M	B	
2N521	G	P		S	100M	A	85	15	10	0						35	E	8.0M	B	
2N521A	G	P		S	150M	A	100	25	12	0	60	250	20M			70	E	8.0M	B	
2N522	G	P		S	100M	A	85	15	8.0	0						60	E	15M	B	
2N522A	G	P		S	150M	A	100	25	10	0	80	320	20M			100	E	15M	B	
2N523	G	P		S	100M	A	85	15	6.0	0						80	E	21M	B	
2N523A	G	P		S	150M	A	100	20	6.0	0	100	400	20M			125	E	21M	B	
2N524	G	P	2N524	A	225M	A	100	45	30	R	25	42	20M	0.13	20M	16	E	800K	B	
2N524A	G	P		A	225M	A	100	45	30	R	25	42	20M	0.13	20M	18	E	0.8M	B	
2N525	G	P		A	225M	A	100	45	30	R	34	65	20M	0.13	20M	30	E	1.0M	B	
2N525A	G	P		A	225M	A	100	45	30	R	34	65	20M	0.13	20M	30	E	1.0M	B	
2N526	G	P		A	225M	A	100	45	30	R	53	90	20M	0.13	20M	44	E	1.3M	B	
2N526A	G	P		A	225M	A	100	45	30	R	53	90	20M	0.13	20M	44	E	1.3M	B	
2N527	G	P		A	225M	A	100	45	30	R	72	121	20M	0.13	20M	60	E	1.5M	B	
2N527A	G	P		A	225M	A	100	45	30	R	72	121	20M	0.13	20M	60	E	1.5M	B	
2N528	G	P			A	2.5W	C	100	40	40		20			0.5A					
2N529	G	P			A	100M	A	85	15	15	0									
2N530	G	P		A	100M	A	85	15	15	0										
2N531	G	P		A	100M	A	85	15	15	0										
2N532	G	P		A	100M	A	85	15	15	0										
2N533	G	P		A	100M	A	85	15	15	0										
2N534	G	P	2N1189	2N1189	A	25M	A	65	50	50	U						35	E		
2N535	G	P	2N1192	2N1191	A	50M	A	85	20	20	U						35	E		
2N535A	G	P	2N1192	2N1191	A	50M	A	85	20	20	U						35	E		
2N535B	G	P			A	50M	A	85	20	20	U						35	E		
2N536	G	P	2N1193	2N1191	S	50M	A	85	20	20	U	100		30M	0.13	10M		1.0M	B	
2N537	G	P		AH	100	J	100	30							4.0	70M				
2N538	G	P	2N2140	2N2137	SP	34W	J	95	80	60		20	50	2.0A	0.6	2.0A				
2N538A	G	P	2N2140	2N2137	SP	34W	J	95	80	60		20	50	2.0A	0.6	2.0A				
2N539	G	P	2N2145	2N2137	SP	34W	J	95	80	55		30	75	2.0A	0.6	2.0A				
2N539A	G	P	2N2145	2N2137	SP	11W	J	95	80	55		30	75	2.0A	0.6	2.0A				
2N540	G	P	2N1551	2N1539	SP	34W	J	95	80	55		45	113	2.0A	0.6	2.0A				
2N540A	G	P	2N1551	2N1539	SP	34W	J	95	80	55		45	113	2.0A	0.6	2.0A				
2N541	S	N	2N2221	2N2218	AH	0.2W	A	200	15	15	0				1.5	5.0M		80	E	
2N541A	S	N	2N2221	2N2218	A	0.2W	A	200	15	15	0	20			1.0	5.0M		80	E	
2N542	S	N	2N2221	2N2218	AH	0.2W	A	200	30	30	0				1.5	5.0M		80	E	
2N542A	S	N	2N2221	2N2218	A	0.2W	A	200	30	30	0				1.0	5.0M		80	E	
2N543	S	N	2N2221	2N2218	AH	0.2W	A	200	50	50	0	20			1.5	5.0M		80	E	
2N543A	S	N	2N2221	2N2218	A	0.2W	A	200	45	45	0	20			1.0	5.0M		80	E	
2N544	G	P		AH	80M	A	71	34												
2N545	S	N	2N4238	2N4237	AH	5W	C	200	60	60	0	15	80	0.5A	5.0	0.5A				
2N546	S	N	2N4237	2N4237	AH	5W	C	200	30	30	0	15	80	0.5A	3.0	0.5A				



**2N550-2N635**

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —		Subscript
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	@ I <sub>C</sub> Units			Units	Units	
2N550	S	N	2N4237	2N4237	AH	5W	C	200	30	30	0	20	80	0.2A	4.0	0.2A		4.0M	T	
2N551	S	N			AH	5W	C	200	60	60	0	20	80	50M	2.0	50M		3.0M	T	
2N552	S	N			AH	5W	C	200	30	30	0	20	80	50M	2.0	50M		3.0M	T	
2N553	S	N			SP	35W	C	95	80			40	80	500M	0.9	3.0A				
2N554	G	P		2N178	AP	40W	J	90									5.0K	B		
2N555	G	P		2N178	AP	10W	J	90	40		X	35	70	1.0M	0.5	200M				
2N556	G	P			S	100M	A	85	25	20	X	20		1.0M	0.5	200M				
2N557	G	P			S	100M	A	75	15	15	X	60		1.0M	0.75	200M				
2N558	G	P			S	100M	A	75	15	15				1.0M	0.3	10M				
2N559	G	P		2N5591	S	0.15W	A	100	15	15				100M	0.5	10M				
2N560	S	N			S	500M	A	150	60		S	20	50	4.0A						
2N561	G	P			A	50W	A	100	80	50	S	20								
2N563	G	P	2N650	2N650	S	150M	A	85	30	25	0	10	30							
2N564	G	P	2N650	2N650	S	120M	A	85	30	25	0	10	30							
2N565	G	P	2N651	2N650	S	150M	A	85	30	25	0	30	50							
2N566	G	P	2N651	2N650	S	120M	A	85	30	25	0	30	50							
2N567	G	P	2N651	2N650	S	150M	A	85	30	25	0	50	70							
2N568	G	P	2N651	2N650	S	120M	A	85	30	25	0	50	70							
2N569	G	P	2N1193	2N1191	S	150M	A	85	30	20	0	70	100							
2N570	G	P	2N1192	2N1191	S	120M	A	85	30	20	0	70	100							
2N571	G	P	2N1193	2N1191	S	150M	A	85	30	10	0	100								
2N572	G	P	2N1193	2N1191	S	120M	A	85	30	10	0	100								
2N573	G	P			A	0.2W	A	100	40	25	0	30	300	50M	0.2	10A				
2N574	G	P	2N1550	2N1539	SP	180W	J	100	60	55	0	9.0	22	10A						
2N574A	G	P	2N1551	2N1539	SP	180W	J	100	80	60	0	9.0	22	10A	0.2	10A				
2N575	G	P	2N1554	2N1539	SP	180W	J	100	60	50	0	19	42	10A	0.5	25A				
2N575A	G	P	2N1555	2N1539	SP	180W	J	100	80	55	0	19	42	10A	0.5	25A				
2N576	G	N			S	200M	A	100	20	20	R	20	60	400M	0.4	400M	2.0M	B		
2N576A	G	N			S	200M	A	100	40	20	R	20	60	400M	0.4	400M	5.0M	B		
2N577	G	P			AL	25M	A	55	25											
2N578	G	P			S	120M	A	71	20		10		400M	0.3	400M		3.0M	B		
2N579	G	P			S	120M	A	71	20		20		400M	0.3	400M		5.0M	B		
2N580	G	P			S	120M	A	71	20		30		400M	0.3	400M		10M	B		
2N581	G	P			S	80M	A	71	18		20		20M		20M		4.0M	B		
2N582	G	P			S	120M	A	71	25		40		20M	0.3	100M		14M	B		
2N583	G	P			S	80M	A	71	18		20		20M		20M		4.0M	B		
2N584	G	P			S	120M	A	71	25		40		20M	0.3	100M		14M	B		
2N585	G	P			S	120M	A	71	25		20		20M	0.2	20M		3.0M	B		
2N586	G	P	2N1191	2N1191	S	250M	A	85	45		35		250M	0.5	250M					
2N587	G	N			S	150M	A	100	40	20	R	20	200M	0.5	200M					
2N588	G	P	2N3324	2N3323	AH	30M	A	85	15	15	S	30	10M	0.2	10M	200M	M			
2N588A	G	P			AP	60M	A	85	15	15	S	30	10M	0.2	10M	200M	M			
2N589	G	P	2N1532	2N1529	AH	90W	C	100	100	75	S	20	40	3.0A	1.5	3.0A	5.0K	E		
2N591	G	P	2N1192	2N1191	A	50M	A	71	32	32	0									
2N592	G	P			S	125M	A	85	20	20	0	20								
2N593	G	P			S	125M	A	85	40	30	0	20								
2N594	G	N			S	100M	A	85	20	20	0	20					1.5M	E		
2N595	G	N			S	100M	A	85	15	15	0	35					3.0M	E		
2N596	G	N			S	100M	A	85	10	10	0	50					5.0M	E		
2N597	G	P	2N3427	2N3427	S	250M	A	100	45	40	S	40	100M	0.2	10M		3.0M	B		
2N598	G	P	2N3427	2N3427	S	250M	A	100	35	35	S	70	225	100M	0.2	10M		5.6M	T	
2N599	G	P	2N3428	2N3427	S	250M	A	100	30	20	S	100	100M	0.2	10M		10M	T		
2N600	G	P	2N3427	2N3427	SP	750M	C	100	35	35	S	70	225	100M	0.2	10M		5.6M	T	
2N601	G	P	2N3428	2N3427	SH	750M	C	100	30	20	S	100	100M	0.2	10M		10M	T		
2N602	G	P			SH	120M	A	85	20	20	0	20	80	0.25	10M		10M	T		
2N603	G	P			SH	120M	A	85	30	20	0	30	100	0.25	15M		30M	T		
2N604	G	P			SH	120M	A	85	30	20	0	40	140	0.25	20M		50M	T		
2N605	G	P			AH	0.12W	A	85	15	15	0									
2N606	G	P			AH	0.12W	A	85	15	15	0									
2N607	G	P			AH	0.12W	A	85	15	15	0									
2N608	G	P			AH	0.12W	A	85	15	15	0									
2N609	G	P	2N1193	2N1191	A	180M	A	85	25	15	0									
2N610	G	P	2N1193	2N1191	A	180M	A	85	25	15	0									
2N611	G	P	2N1192	2N1191	A	180M	A	85	25	15	0									
2N612	G	P	2N1191	2N1191	A	180M	A	85	25	15	0									
2N613	G	P	2N1191	2N1191	A	180M	A	85	25	15	0									
2N614	G	P			AH	180M	A	85	20	15	0									
2N615	G	P			AH	180M	A	85	20	15	0									
2N616	G	P			AH	180M	A	85	15	12	0									
2N617	G	P			AH	180M	A	85	15	12	0									
2N618	G	P			AP	90W	C	95	80	60	S	60	140	1.0A	0.8	2.0A	5.0K	E		
2N619	S	N			A	175M	A	160	50	40	0	9.0	22	5.0M	0.5	8.0M	200K	B		
2N620	S	N	2N2222A	2N2218	A	175M	A	160	50	35	0	18	44	5.0M	0.4	8.0M		250K	B	
2N621	S	N	2N2222A	2N2218	A	175M	A	160	50	30	0	36	88	5.0M	0.3	8.0M		300K	B	
2N622	S	N	2N2222A	2N2218	AM	385M	A	160	50	30	0							300K	B	
2N624	G	P			AH	100M	A	100	30	20	S						20M	E		
2N625	G	N			S	1500M	C	100	40	30	S	20	500M	1.0	500M					
2N626	G	P			AP	90W	C	100	40	30	S	10	30	10A	1.0	10A		5.0K	E	
2N627	G	P			AP	90W	C	100	60	45	S	10	30	10A	1.0	10A		5.0K	E	
2N628	G	P			AP	90W	C	100	80	60	S	10	30	10A	1.0	10A		5.0K	E	
2N629	G	P			AP	90W	C	100	100	75	S	10	30	10A	1.0	10A		5.0K	E	
2N630	G	P			AP	90W	C	100	100	75	S	10	30	10A	1.0	10A				
2N631	G	P	2N1194	2N1191	A	167M	A	85	25	20	R									
2N632	G	P	2N1193	2N1191	A	167M	A	85	36	20	R									
2N633	G	P	2N1192	2N1191	A	167M	A	85	35	30	R									
2N634	G	N			SH	150M	A	85	20	20	0	15		200M				5.0M	B	
2N634A	G	N			S	2.5M	J	85	25	20	R	40	120	10M	0.2	10M		5.0M	B	
2N635	G	N			SH	150M	A	85	20	20	0	25		200M				10M	B	



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE—</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)					Units	
2N635A	G	N	MP277 MP278 MP279 MP1338 MP1338A MP1338B MP259 MP260 MP261		S	2.5M	J	85	25	20	R	80	240	10M	0.2	10M			10M	B
2N636	G	N			SH	150M	A	85	20	20	O	35		200M					15M	B
2N636A	G	N			S	2.5M	J	85	25	15	R	100	300	10M	0.15	10M		15M	B	
2N637	G	P			SP	60W	C	100		35	R	30	60	3.0A	1.5	3.0A				
2N637A	G	P			SP	60W	C	100		65	R	30	60	3.0A	1.5	3.0A				
2N637B	G	P			SP	60W	C	100		75	R	30	60	3.0A	1.5	3.0A				
2N638	G	P			SP	60W	C	100		35	R	20	40	3.0A	2.0	3.0A				
2N638A	G	P			SP	60W	C	100		65	R	20	40	3.0A	2.0	3.0A				
2N638B	G	P			SP	60W	C	100		75	R	20	40	3.0A	2.0	3.0A				
2N639	G	P			SP	37W	C	100		35	R	15		3.0A	2.5	3.0A				
2N639A	G	P			SP	37W	C	100		65	R	15		3.0A	2.5	3.0A				
2N639B	G	P			SP	37W	C	100		75	R	15		3.0A	2.5	3.0A				
2N640	G	P			A	80M	A	71	34											
2N641	G	P			A	80M	A	71	34											
2N642	G	P			A	80M	A	71	34											
2N643	G	P	2N2955	2N2955	S	120M	A	71	30		20		10M				20M	T		
2N644	G	P	2N2955	2N2955	S	120M	A	71	30		20		10M				20M	T		
2N645	G	P	2N2955	2B2955	S	120M	A	71	30		20		10M				20M	T		
2N646	G	N			A	100M	A	85	25	25	O	50	150	30M						
2N647	G	N			A	100M	A	71	25	25	O									
2N649	G	N			A	100M	A	71	20	18	O									
2N650	G	P		2N650	A	0.2W	A	100	45	30	R	30	10M	0.25	50M	30	0.75M	E		
2N650A	G	P		2N650	A	0.2W	A	100	45	30	R	33	10M	0.25	50M	30	0.75M	E		
2N651	G	P		2N650	A	0.2W	A	100	45	30	R	45	10M	0.25	50M	50	1.0M	B		
2N651A	G	P		2N650	A	0.2W	A	100	45	30	R	45	10M	0.25	50M	50	1.0M	B		
2N652	G	P		2N650	A	0.2W	A	100	45	30	R	80	10M	0.25	50M	100				
2N652A	G	P		2N650	A	0.2W	A	100	45	30	R	80	10M	0.25	50M	100				
2N653	G	P		2N653	A	0.2W	A	100	30	25	R	20	10M			30				
2N654	G	P		2N653	A	0.2W	A	100	30	25	R	40	10M			50				
2N655	G	P		2N653	A	0.2W	A	100	30	25	R	70	10M			100				
2N656	S	N	2N4238	2N4237	A	4.0W	C	200	60	60	O	30	90	200M						
2N656A	S	N	2N4238	2N4237	A	5.0W	C	200	60	60	O	30	90	200M						
2N657	S	N	2N5681	2N5681	A	4.0W	C	200	100	100	O	30	90	200M						
2N657A	S	N	2N5681	2N5681	A	5.0W	C	200	100	100	O	30	90	200M						
2N658	G	P			S	167M	A	85	25	16	O	25	80	3.45	150M		2.5M	B		
2N659	G	P			S	167M	A	85	25	14	O	40	110	3.5	250M		5.0M	B		
2N660	G	P			S	167M	A	85	25	11	O	60	150	3.5	400M		10M	B		
2N661	G	P			S	167M	A	85	25	9.0	O	80		3.5	550M		15M	B		
2N662	G	P			S	167M	A	85	25	11	O	30		3.4	180M		4.0M	B		
2N663	G	P			SP	35W	C	100	50	25	O	25	75	500M	1.0	3.0A	15K	E		
2N665	G	P		2N665	SP	35W	C	95	80	40	O	40	80	500M	0.9	3.0A	20K	E		
2N669	G	P		2N176	AP	62.5W	C	100	40	30	S		250	0.5A			3.0K	E		
2N670	G	P	2N3428	2N3427	A	300M	A	85	40	40	V	40	250	1.0A	0.35	1.0A	500K	B		
2N671	G	P	2N3428	2N3427	A	800M	C	85	40	40	V	40	250	1.0A	0.35	1.0A	500K	B		
2N672	G	P	2N3428	2N3427	A	300M	A	85	25	25	S			0.2	400M					
2N673	G	P	2N3428	2N3427	A	800M	C	85	25	25	S			0.2	400M					
2N674	G	P	2N3428	2N3427	A	300M	A	85	75	75	V	40	250	1.0A	0.35	1.0A	400K	B		
2N675	G	P	2N3428	2N3427	A	800M	C	85	75	75	V	40	250	1.0A	0.35	1.0A	400K	B		
2N677	G	P	MP439		AP	90W	C	100	50	30	S	20	60	10A	1.0	10A				
2N677A	G	P	MP439A		AP	90W	C	100	60	40	S	20	60	10A	1.0	10A				
2N677B	G	P	MP439B		AP	90W	C	100	90	70	S	20	60	10A	1.0	10A				
2N677C	G	P	MP439C		AP	90W	C	100	100	80	S	20	60	10A	1.0	10A				
2N678	G	P	MP327		AP	90W	C	100	50	20	O	50	100	10A	1.0	10A				
2N678A	G	P	MP328		AP	90W	C	100	60	30	O	50	100	10A	1.0	10A				
2N678B	G	P	MP329		AP	90W	C	100	90	60	O	50	100	10A	1.0	10A				
2N678C	G	P	MP330		AP	90W	C	100	100	70	O	50	100	10A	1.0	10A				
2N679	G	N			S	150M	A	85	25	20	X	20		30M	0.3	100M				
2N680	G	P	2N1191	2N1191	A	150M	A	75	20	20	S	18	165	50M	0.75	50M	15	2.0M	B	
2N681 thru 2N692	Thyristors, see Table on Page 2-70																			
2N694	G	P			AH	0.1W	A	100	30	15	O	10		2.0M			0.9	340M	T	
2N695	G	P			SH	75M	A	100	15	15	S	25		10M	1.0	50M				
2N696	S	N		2N696	S	600M	A	175	60	40	R	20	60	150M	1.5	150M		40M	T	
2N696A	S	N	2N2218	2N2218	S	800M	A	300	60	35	O	20	60	150M	1.5	150M	15	40M	T	
2N697	S	N		2N696	S	600M	A	175	60	40	R	40	120	150M	1.5	150M		40M	T	
2N697A	S	N	2N2218	2N2218	S	800M	A	300	60	35	O	40	120	150M	1.5	150M	25	50M	T	
2N698	S	N	2N3498	2N3498	S	800M	A	200	120	80	R	20	60	150M	1.2	50M	15	40M	T	
2N699	S	N		2N699	S	600M	A	175	120	80	R	40	120	150M	5.0	150M	35	50M	T	
2N699A	S	N	2N3498	2N3498	S	800M	A	300	120	80	R	40	120	150M	5.0	150M	35	50M	T	
2N699B	S	N	2N3498	2N3498	S	870M	A	200	120	100	R	40	120	150M	1.2	50M	35	60M	T	
2N700	G	P		2N700	AH	75M	A	100	25	20	S	1.5		2.0M			4.0	E	270M	
2N700A	G	P		2N700	AH	75M	A	100	25	25	O	1.5		6.0M			4.0	E	360M	
2N702	S	N		2N702	SH	300M	A	175	25	25	O	20	60	10M	0.5	10M		70M	T	
2N703	S	N		2N702	SH	300M	A	175	25	25	O	40	100	10M	0.5	10M		70M	T	
2N705	G	P		2N705	SH	300M	C	100	15	15	S	25		10M	0.3	10M				
2N705A	G	P			SH	150M	A	100	15	15	S	25		10M	0.3	10M				
2N706	S	N		2N706	SH	300M	A	175	25	20	R	20		10M	0.6	10M		200M	T	
2N706A	S	N		2N706	SH	300M	A	175	25	20	R	20	60	10M	0.6	10M		200M	T	
2N706B	S	N		2N706	SH	300M	A	175	25	15	O	20	60	10M	0.4	10M		200M	T	
2N706C	S	N	2N835	2N834	SH	360M	A	200	40	20	R	20	60	10M	0.4	10M		200M	T	
2N707	S	N		2N707	AHP	300M	A	175	56	28	R	9.0		10M	0.6	10M				
2N707A	S	N		2N707	AH	500M	A	175	70	40	O	9.0	50	10M	0.6	10M		70M	T	
2N708	S	N		2N708	SH	360M	A	200	40	20	R	30	120	10M	0.4	10M		300M	T	
2N708A	S	N	2N834	2N834	SH	360M	A	200	50	30	R	40	120	10M	0.1.					



# 2N710A-2N780

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript	
												(min)	(max)	Units	(volts)	Units			Units	
2N710A	G	P		2N711	SH	150M	A	100	15	15	S	25		10M	0.5	10M			150M	T
2N711	G	P		2N711	SH	150M	A	100	12	12	S	20	250	10M	0.5	10M			150M	T
2N711A	G	P		2N711	SH	150M	A	100	15	7.0	O	25	150	10M	0.55	50M			150M	T
2N711B	G	P		2N711	SH	150M	A	100	18	7.0	O	30	150	10M	0.25	10M			150M	T
2N715	S	N	2N2221	2N2218	AH	500M	A	175	50	35	O	10	50	15M	1.2	15M			70M	E
2N716	S	N	2N2221	2N2218	AH	400M	A	175	60	40	R	20	60	150M	1.5	150M			40M	T
2N717	S	N	2N2221	2N2218	AH	400M	A	175	60	40	R	40	120	150M	1.5	150M			50M	T
2N718	S	N		2N718	AH	400M	A	175	60	40	R	40	120	150M	1.5	150M	30	E	60M	T
2N718A	S	N		2N718A	AH	500M	A	200	75	50	R	40	120	150M	1.5	150M	15	E	40M	T
2N719	S	N	2N3498	2N3498	AH	400M	A	175	120	80	R	20	60	150M	5.0	150M	15	E	40M	T
2N719A	S	N	2N3498	2N3498	AH	500M	A	200	120	80	R	20	60	150M	1.2	50M	15	E	40M	T
2N720	S	N	2N3498	2N3498	AH	400M	A	175	120	80	R	40	120	150M	5.0	150M	35	E	50M	T
2N720A	S	N		2N720A	S	500M	A	200	120	100	R	40	120	150M	5.0	150M	30	E	50M	T
2N721	S	P			AH	400M	A	200	50	50	R	20	45	150M	1.5	150M	15	E	50M	T
2N721A	S	P	2N2905	2N2904	AH	500M	A	200	50	50	R	20	45	150M	0.5	150M	15	E	50M	T
2N722	S	P		2N722	AH	400M	A	175	50	50	R	30	90	150M	1.5	150M	25	E	60M	T
2N722A	S	P	2N2837	2N2800	AH	500M	A	200	50	50	R	30	90	150M	0.5	150M	25	E	60M	T
2N725	G	P			SH	150M	A	100	15	12	S	20		10M						
2N726	S	P	2N727	2N727	A	300M	A	175	25	20	O	15	45	10M	0.6	10M	15	E	140M	T
2N727	S	P		2N727	A	300M	A	175	25	20	O	30	120	10M	0.6	10M	30	E	140M	T
2N728	S	N	2N2539	2N2537	SH	4.0M	A	175	15	15	O	20	200	10M	0.7	10M			100M	T
2N729	S	N	2N2539	2N2537	SH	4.0M	A	175	30	30	O	20	200	10M	0.7	10M			100M	T
2N730	S	N	2N2218	2N2218	A	500M	A	175	60	40	R	20	60	150M	1.5	150M			40M	T
2N731	S	N		2N731	A	500M	A	175	60	40	R	40	120	150M	1.5	150M			25M	T
2N734	S	N	2N2221	2N2218	A	500M	A	175	80	60	O	15	50	5.0M	1.0	10M	20	E		
2N734A	S	N	2N2218A	2N2218	A	0.5W	A	200	80	60	O	15	50	5.0M	0.5	10M	20	E	30M	T
2N735	S	N		2N735	A	500M	A	175	80	60	O	30	100	5.0M	1.0	10M	40	E		
2N735A	S	N	2N2218A	2N2218	A	0.5W	A	200	80	60	O	30	100	5.0M	0.5	10M	40	E	60M	T
2N736	S	N	2N2222	2N735	A	500M	A	175	80	60	O	60	200	5.0M	1.0	10M	80	E		
2N736A	S	N	2N2222	2N2218	A	500M	A	175	80	60	O	60	200	5.0M	0.6	10M	80	E	100M	T
2N736B	S	N	2N2896	2N2895	A	0.5W	A	200	80	60	O	60	200	5.0M	0.5	10M	80	E	100M	T
2N738	S	N	2N2896	2N2895	A	500M	A	175	125	80	O	15	50	5.0M	1.0	10M	20	E		
2N738A	S	N	2N2896	2N2895	A	0.5W	A	200	125	80	O	15	50	5.0M	0.5	10M	20	E	30M	T
2N739	S	N		2N735	A	500M	A	175	125	80	O	30	100	5.0M	1.0	10M	40	E		
2N739A	S	N	2N2896	2N2895	A	0.5W	A	200	125	80	O	30	100	5.0M	0.5	10M	40	E	60M	T
2N740	S	N		2N735	A	0.5W	A	200	125	80	O	60	200	5.0M			80	E		
2N740A	S	N	2N2896	2N2895	A	0.5W	A	200	125	80	O	60	200	5.0M	0.5	10M	80	E	100M	T
2N741	G	P		2N741	AH	150M	A	100	15	15	S	10		5.0M			20	E		
2N741A	G	P		2N741	AH	150M	A	100	20	20	S	10		5.0M			20	E	300M	T
2N742	S	N	2N2218	2N2218	S	0.5W	A	200	60	60	O	25		10M	0.5	10M				
2N742A	S	N	2N2218	2N2218	S	0.5W	A	200	60	60	O	25		10M	0.5	10M				
2N743	S	N		2N743	SH	300M	A	200	20	12	O	20	60	10M	0.35	10M			200M	T
2N743A	S	N	2N2369	2N2369	SH	0.36W	A	200	40	15	O	20	60	10M					500M	T
2N744	S	N		2N744	SH	300M	A	175	20	12	O	40	120	10M	0.35	10M			300M	T
2N744A	S	N	2N2369	2N2369	SH	0.36W	A	200	40	15	O	40	120	10M					500M	T
2N745	S	N	2N2221	2N2218	A	0.15W	A	175	45	30	O	20	55	10M			19	E	10M	B
2N746	S	N	2N2221	2N2218	A	0.15W	A	175	45	30	O	45	150	10M			39	E	10M	B
2N747	S	N	2N2221	2N2218	S	200M	A	175	25	25	O	30	90	10M	0.6	5.0M				
2N748	S	N	2N2221	2N2218	S	200M	A	175	30	30	O	20	40	10M	0.5	5.0M				
2N749	S	N	2N2221	2N2218	AH	200M	A	175	45	25	O	15	55	10M			30	E	50M	B
2N751	S	N	2N2221	2N2218	AH	200M	A	175	20	20	O	30	150	10M			10	E	20M	B
2N752	S	N	2N2221	2N2218	AH	0.5W	A	200	85	45	O				1.2	15M	40	E	200M	T
2N753	S	N		2N706	SH	300M	A	175	60	60	R	40	120	10M	0.6	10M			200M	T
2N754	S	N		2N3019	AH	0.3W	A	175	100	80	R	20	80	5.0M	0.8	10M			30M	T
2N755	S	N		2N3019	A	0.5W	A	200	45	45	O				1.0	10M	12	E	50M	B
2N756	S	N	2N2218	2N2218	A	0.5W	A	200	60	60	O				1.0	10M	12	E	50M	B
2N757	S	N	2N2218	2N2218	A	0.5W	A	200	45	45	O				1.0	10M	18	E	50M	B
2N757A	S	N		2N3019	A	0.5W	A	200	60	60	O				1.0	10M	18	E	50M	B
2N758	S	N	2N2218	2N2218	A	0.5W	A	200	45	45	O				1.0	10M	18	E	50M	B
2N758A	S	N		2N3019	A	0.5W	A	200	60	60	O				1.0	10M	18	E	50M	B
2N758B	S	N		2N3019	A	0.5W	A	200	60	60	O	12	1.0M	0.5	10M	18	E	50M	B	
2N759	S	N	2N2218	2N2218	A	0.5W	A	200	45	45	O				1.0	10M	36	E	50M	B
2N759A	S	N	2N3019	2N3019	A	0.5W	A	200	60	60	O				1.0	10M	36	E	50M	B
2N759B	S	N	2N3019	2N3019	A	0.5W	A	200	60	60	O	25	1.0M	0.5	10M	36	E	50M	B	
2N760	S	N	2N2218	2N2218	A	0.5W	A	200	45	45	O				1.0	10M	76	E	50M	B
2N760A	S	N	2N3019	2N3019	A	0.5W	A	200	60	60	O				1.0	10M	76	E	50M	B
2N760B	S	N	2N3019	2N3019	A	0.5W	A	200	60	60	O	50		1.0M	0.5	10M	76	E	50M	B
2N761	S	N	2N2218A	2N2218A	A	0.5W	A	200	50	30	O	20	55	10M	1.0	10M	19	E	50M	B
2N762	S	N	2N2218A	2N2218	A	0.5W	A	200	50	30	O	45	150	10M	1.0	10M	39	E	50M	B
2N764 thru 2N767			Thyristors, see Table on Page 2-70																	
2N768	G	P	2N961	2N956	SH	35M	A	100	12	10	S	25		2.0M	0.13	2.0M			125M	T
2N769	G	P	2N961	2N956	SH	35M	A	100	12	7.0	O	25		20M	0.25	10M			100M	T
2N770	S	N	2N3014	2N3013	SH	150M														



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript						
						@ 25°C	°C	(volts)	(volts)	(min)							(max)	Units	Units	Units	Units	
2N781	G	P			SH	150M	A	100	15	15	S	25		10M	0.16	10M						
2N782	G	P			SH	150M	A	100	12	12	S	20		10M	0.20	10M						
2N783	G	N	2N834	2N834	SH	300M	A	175	40	20	R	60	10M	0.25	10M					200M	T	
2N784	G	N	2N834	2N834	SH	300M	A	175	30	15	R	25	10M	0.19	10M					200M	T	
2N784A	G	N	2N834	2N834	SH	350M	A	200	40	20	R	25	150	10M	0.65	100M					300M	T
2N785	G	P			A	50M	A	85	12	12	S											
2N789	G	N	2N3946	2N3946	A	150M	A	175	45	30	O				1.0	5.0M	9.0	E	E	1.0M	B	
2N790	G	N	2N3946	2N3946	A	150M	A	175	45	30	O				1.0	5.0M	18	E	E	2.0M	B	
2N791	G	N	2N3946	2N3946	A	150M	A	175	45	30	O				1.0	5.0M	18	E	E	8.0M	B	
2N792	G	N	2N3946	2N3946	A	150M	A	175	45	30	O				1.0	5.0M	36	E	E	2.0M	B	
2N793	G	N	2N3946	2N3946	A	150M	A	175	45	30	O				1.0	5.0M	76	E	E	2.0M	B	
2N794	G	P			SH	120M	A	85	13			30	10M	0.3	10M					25M	T	
2N795	G	P			SH	120M	A	85	13			30	10M	0.5	40M					35M	T	
2N796	G	P			SH	120M	A	85	13			50	10M	0.5	40M					50M	T	
2N797	G	N			SH	150M	A	100	20	7.0	O	40	10M	0.14	10M					600M	T	
2N799	G	P			S	75M	A	85	25	12	O	30	12M	0.15	12M					4.0M	B	
2N800	G	P			S	75M	A	85	25	12	O	30		0.15	12M					4.0M	B	
2N801	G	P			S	75M	A	85	30	18	O	30	60									
2N802	G	P			S	75M	A	85	30	18	O	30	60									
2N803	G	P			S	75M	A	85	30	15	O	40	80									
2N804	G	P			S	75M	A	85	30	15	O	40	80									
2N805	G	P			S	75M	A	85	30	12	O	60										
2N806	G	P			S	75M	A	85	30	12	O	60										
2N807	G	P			S	70M	A	85	25	14	V	40	20M	0.2	20M					14M	B	
2N808	G	P			S	70M	A	85	25	14	V	40	20M	0.2	20M					14M	B	
2N809	G	P			AH	75M	A	85	30	15	O	25	110	25M						3.0M	B	
2N810	G	P			AH	75M	A	85	30	15	O	25	110	25M						3.0M	B	
2N811	G	P			AH	75M	A	85	30	12	O	45	180	45M						5.0M	B	
2N812	G	P			AH	75M	A	85	30	12	O	45	180	45M						5.0M	B	
2N813	G	P			AH	75M	A	85	30	10	O	55	220	55M						15M	B	
2N814	G	P			AH	75M	A	85	30	10	O	55	220	55M						15M	B	
2N815	G	N			S	75M	A	85	25	15	O	60	180	30M	0.75	200M						
2N816	G	N			S	75M	A	85	25	15	O	60	180	30M	0.75	200M						
2N817	G	N			S	75M	A	85	30	15	O	20	50M	0.25	50M							
2N818	G	N			S	75M	A	85	30	15	O	20	50M	0.25	50M							
2N819	G	N			S	75M	A	85	30	20	O	30	50M	0.25	50M							
2N820	G	N			S	75M	A	85	30	20	O	30	50M	0.25	50M							
2N821	G	N			S	75M	A	85	30	25	O	40	50M	0.25	50M							
2N822	G	N			S	75M	A	85	30	25	O	40	50M	0.25	50M							
2N823	G	N			S	75M	A	85	25	12	O	40	20M	0.15	12M					4.0M	B	
2N824	G	P			AH	70M	A	85	30	18	O									2.0M	B	
2N825	G	P			S	70M	A	85	30	20	O	40	40							2.5M	B	
2N826	G	P			S	70M	A	85	30	20	O	20	40							2.5M	B	
2N827	G	P		2N827	SH	150M	A	100	20	20	S	100	10M	0.25	10M					250M	T	
2N828	G	P		2N828	SH	150M	A	100	15	15	S	25	10M	0.2	10M					300M	T	
2N828A	G	P		2N828A	SH	150M	A	100	15	15	S	25	10M	0.2	10M					300M	T	
2N829	G	P		2N828A	SH	150M	A	100	15	15	S	25	10M	0.2	10M					300M	T	
2N834	S	N		2N834	SH	300M	A	175	40	30	S	25	10M	0.25	10M					350M	T	
2N834A	S	N			SH	360M	A	200	40	30	S	25	10M	0.25	10M					500M	T	
2N835	S	N	2N834	2N834	SH	0.3W	A	175	25	20	O	20	10M	0.3	10M					300M	T	
2N837	G	P			SH	150M	A	100	12	12	S	30	10M	0.25	10M							
2N838	G	P		2N838	SH	150M	A	100	30	30	S	30	10M	0.18	10M					300M	T	
2N839	S	N	2N2222	2N2218	AH	0.3W	A	175	45	45	O	15	50	10M	2.0	10M				30M	T	
2N840	S	N		2N840	AH	0.3W	A	175	45	45	O	30	100	10M	2.0	10M				40M	T	
2N841	S	N		2N840	AH	0.3W	A	175	45	45	O	60	400	10M	2.0	10M				40M	T	
2N842	S	N	2N2221	2N2218	AH	0.3W	A	175	45	45	O	20	55	10M	1.2	10M				30M	T	
2N843	S	N	2N2222	2N2218	AH	0.3W	A	175	45	45	O	45	150	10M	1.2	10M				40M	T	
2N844	S	N	2N2896	2N2895	AH	0.3W	A	175	60	60	R	40	120	5.0M	0.8	10M				50M	T	
2N845	S	N	2N2896	2N2895	AH	0.3W	A	175	100	80	R	40	120	5.0M	0.8	10M				50M	T	
2N846	G	P	2N960	2N960	SH	60M	A	100	15	15	S	25	125	10M	0.18	10M				320M	T	
2N846A	G	P	2N960	2N960	SH	60M	A	100	15	15	S	25	125	10M	0.14	10M				320M	T	
2N847	S	N	2N835	2N834	S	0.2W	A	175	20	15	O			1.5	10M							
2N848	S	N	2N834	2N834	S	0.2W	A	175	40	25	O			1.5	10M							
2N849	S	N	2N835	2N834	SH	300M	A	175	25	15	O	20	60	10M	0.6	10M				600M	T	
2N850	S	N	2N834	2N834	SH	300M	A	175	25	15	O	40	120	10M	0.6	10M				600M	T	
2N851	S	N	2N835	2N834	SH	300M	A	175	20	12	O	20	60	10M						300M	T	
2N852	S	N	2N834	2N834	SH	300M	A	175	20	12	O	40	120	10M						300M	T	
2N858	S	P	2N2906	2N2904	S	150M	A	140	40	40	O	10	60	5.0M	0.15	5.0M	15	E	E	5.0M	T	
2N859	S	P	2N2906	2N2904	S	150M	A	140	40	40	O	25	100	5.0M	0.15	5.0M	30	E	E	6.0M	T	
2N860	S	P	2N2906	2N2904	S	150M	A	140	25	25	O	10	40	5.0M	0.15	5.0M	15	E	E	6.5M	T	
2N861	S	P	2N2906	2N2904	S	150M	A	140	25	25	O	25	75	5.0M	0.15	5.0M	30	E	E	7.5M	T	
2N862	S	P	2N2906	2N2904	S	150M	A	140	15	15	O	12	48	5.0M	0.15	5.0M	20	E	E	8.0M	T	
2N863	S	P	2N2906	2N2904	S	150M	A	140	15	15	O	25	100	5.0M	0.15	5.0M	40	E	E	10M	T	
2N864	S	P	2N2906	2N2904	S	150M	A	140	6.0	6.0	O	20	100	5.0M	0.1	5.0M	25	E	E	16M	T	
2N864A	S	P	2N2906	2N2904	S	300M	A	175	6.0	6.0	O	20	250	5.0M	0.1	5.0M	25	E	E	16M	T	
2N865	S	P	2N2906	2N2904	S	150M	A	140	10	10												



2N903-2N991

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25 °C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> -- (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub> (volts)	h <sub>FE</sub> -- (volts)	Subscript	f <sub>T</sub> -- Units	Subscript		
												(min)	(max)							
2N903	S	N	2N2221	2N2218	A	150M	A	175	45	30	0				1.0	5.0M	18	E	2.0M	
2N904	S	N	2N2221	2N2218	A	150M	A	175	45	30	0				1.0	5.0M	18	E	8.0M	
2N905	S	N	2N2221	2N2218	A	150M	A	175	45	30	0				1.0	5.0M	36	E	2.0M	
2N906	S	N	2N2221	2N2218	A	150M	A	175	45	30	0				1.0	5.0M	76	E	2.0M	
2N907	S	N	2N2221	2N2218	A	0.15W	A	175	45	30	0	20	55	10M			19	E	12M	T
2N908	S	N	2N2221	2N2218	A	0.15W	A	175	45	30	0	45	150	10M			39	E	25M	T
2N909	S	N	2N2222	2N2218	A	400M	A	175	60	30	R	110	350	50M	0.5	10M	40	E	50M	T
2N910	S	N		2N910	A	500M	A	200	100	80	R	75		10M	0.4	10M	76	E	60M	T
2N911	S	N		2N910	A	500M	A	200	100	80	R	35		10M	0.4	10M	36	E	50M	T
2N912	S	N	2N2895	2N2895	A	500M	A	200	100	80	R	15		10M	0.4	10M	18	E	40M	T
2N914	S	N	2N914	2N914	SH	360M	A	200	40	20	R	30	120	10M	0.7	200M			300M	T
2N914A	S	N	2N2369	2N2369	SH	360M	A	200	40	20	R	30	120	10M	0.4	200M			300M	T
2N915	S	N		2N915	AH	360M	A	200	70	50	0	50	200	10M	1.0	10M	50	E	250M	T
2N915A	S	N			AHP	1.2W	C	200	70	50	0	50	250	5.0M	0.2	10M	50	E	600M	T
2N916	S	N		2N916	AH	360M	A	200	45	25	0	50	200	10M	0.5	10M	50	E	300M	T
2N916A	S	N	2N918	2N918	AH	360M	A	200	45	25	0	50	200	10M	0.5	10M	50	E	300M	T
2N916B	S	N			AHP	1.2W	C	200	60	30	0	50	200	10M	0.2	10M			500M	T
2N917	S	N	2N918	2N918	AH	200M	A	200	30	15	0	20	200	3.0M	0.5	3.0M			500M	T
2N917A	S	N	2N918	2N918	AH	200M	A	200	30	15	0	20	200	3.0M	0.4	10M			600M	T
2N918	S	N		2N918	AH	200M	A	200	30	15	0	20		3.0M	0.5	10M			600M	T
2N919	S	N		2N918	AH	200M	A	200	30	15	0	20	60	10M	0.2	10M			200M	T
2N920	S	N	2N834	2N834	SH	0.36W	A	200	25	15	0	40	120	10M	0.2	10M			200M	T
2N921	S	N	2N834	2N834	SH	0.36W	A	200	50	20	0	20	60	10M	0.3	10M			200M	T
2N922	S	N	2N834	2N834	SH	0.36W	A	200	50	20	0	40	120	10M	0.3	10M			200M	T
2N923	S	P	2N2906	2N2904	A	0.25W	A	200	40	25	0				0.5	5.0M			0.8M	B
2N924	S	P	2N2906	2N2904	A	0.25W	A	200	40	25	0				0.5	5.0M	12	E	0.8M	B
2N925	S	P	2N2906	2N2904	A	0.25W	A	200	50	40	0				0.5	5.0M	10	E	0.8M	B
2N926	S	P	2N2906	2N2904	A	0.25W	A	200	50	40	0				0.5	5.0M	20	E	0.8M	B
2N927	S	P	2N2906	2N2904	A	0.25W	A	200	70	60	0				0.5	5.0M	8.0	E	0.8M	B
2N928	S	P	2N2906	2N2904	A	0.25W	A	200	70	60	0				0.5	5.0M	18	E	0.8M	B
2N929	S	N		2N929	A	600M	C	175	45	45	0	40	120	10M	1.0	10M	150	E	1.0M	B
2N929A	S	N		2N929	A	0.5W	A	200	60	45	0	40	120	10M	0.5	10M	60	E	45M	T
2N930	S	N		2N929	A	600M	C	175	45	45	0	100	300	10M	1.0	10M	150	E	1.0M	B
2N930A	S	N		2N929	A	0.5W	A	200	60	45	0	100	300	10M	0.5	10M	150	E	45M	T
2N930B	S	N	2N930A	2N929	A	500M	A	60	45	0	100	300	10M	1.0	10M	150	E	45M	T	
2N934	G	P	2N965	2N960	SH	150M	A	85	13	12	0	40		40M	0.3	5.0M			35M	T
2N935	S	P	2N2907A	2N2904	A	0.25W	A	160	50	40	0	9.0	22		0.3	5.0M				
2N936	S	P	2N2907A	2N2904	A	0.25W	A	160	50	35	0	18	44		0.5	5.0M				
2N937	S	P	2N2907A	2N2904	A	0.25W	A	160	50	30	0	36	88		0.6	5.0M				
2N938	S	P	2N2907A	2N2904	A	0.25W	A	175	40	35	0				0.3	5.0M	9.0	E	1.0M	B
2N939	S	P	2N2907A	2N2904	A	0.25W	A	175	40	35	0				0.3	5.0M	18	E	2.0M	B
2N940	S	P	2N2907A	2N2904	A	0.25W	A	175	40	35	0				0.3	5.0M	36	E	2.0M	B
2N941	S	P	2N2907A	2N2904	SC	0.25W	A	175	25	8	U	10		1.0M			25	E	16M	T
2N942	S	P	2N2907A	2N2904	SC	0.25W	A	175	25	8	U	10		1.0M			25	E	10M	T
2N943	S	P	2N2907A	2N2904	SC	0.25W	A	175	40	18	0	10			0.003	25	E	1.0M	B	
2N944	S	P	2N2907A	2N2904	SC	0.25W	A	175	40	18	0	10			0.004	25	E	1.0M	B	
2N945	S	P	2N2907A	2N2904	SC	0.25W	A	175	50	50	0	10			0.005	25	E	1.0M	B	
2N946	S	P	2N2907A	2N2904	SC	0.25W	A	175	80	80	0	10			0.005	25	E	1.0M	B	
2N947	S	N	2N834	2N834	S	360M	A	150	20	15	R	20		10M	0.4	5.0M			200M	T
2N948																				
thru																				
2N951																				
2N955	G	N			SH	150M	A	100	12	8.0	0	30		30M	0.5	30M				
2N955A	G	N			SH	150M	A	100	12	8.0	0	30		30M	0.3	30M				
2N956	S	N		2N718A	AH	500M	A	200	75	50	R	100	300	150M	1.5	150M	50	E	70M	T
2N957	S	N	2N2501	2N2501	AH	250M	A	150	40	20	0	45		10M	1.5	10M			200M	T
2N958	S	N	2N835	2N834	SH	0.25W	C	150	25	15	0	20		10M	0.2	10M			200M	T
2N959	S	N	2N835	2N834	SH	0.25W	C	150	25	15	0	40		10M	0.2	10M			200M	T
2N960	G	P		2N960	SH	150M	A	100	15	15	S	20		10M	0.2	10M			300M	T
2N961	G	P		2N960	SH	150M	A	100	12	12	S	20		10M	0.2	10M			300M	T
2N962	G	P		2N960	SH	150M	A	100	12	12	S	20		10M	0.2	10M			300M	T
2N963	G	P		2N963	SH	150M	A	100	12	12	S	20		10M	0.2	10M			250M	T
2N964	G	P		2N960	SH	150M	A	100	15	15	S	40		10M	0.18	10M			300M	T
2N964A	G	P		2N964A	SH	150M	A	100	15	15	S	40		10M	0.18	10M			300M	T
2N965	G	P		2N960	SH	150M	A	100	12	12	S	40		10M	0.18	10M			300M	T
2N966	G	P		2N960	SH	150M	A	100	12	12	S	40		10M	0.18	10M			300M	T
2N967	G	P		2N963	SH	150M	A	100	12	12	S	40		10M	0.2	10M			250M	T
2N968	G	P		2N963	SH	150M	A	100	15	15	S	17		10M	0.25	10M			300M	T
2N969	G	P		2N963	SH	150M	A	100	12	12	S	17		10M	0.25	10M			300M	T
2N970	G	P		2N963	SH	150M	A	100	12	12	S	17		10M	0.25	10M			300M	T
2N971	G	P		2N963	SH	150M	A	100	7.0	7.0	S	17		10M	0.25	10M			300M	T
2N972	G	P		2N963	SH	150M	A	100	15	15	S	40		10M	0.25	10M			300M	T
2N973	G	P		2N963	SH	150M	A	100	12	12	S	40		10M	0.25	10M			300M	T
2N974	G	P		2N963	SH	150M	A	100	12	12	S	40		10M	0.					



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS								
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>		f <sub>T</sub>			
						@ 25°C	°C	(volts)	(volts)	Subscript	(min)	(max)	Units	Units	Subscript	Units	Subscript	Units	
2N992	G	P	2N3250 2N720A	2N869	AH	67M	A	75	20	20	40	1.0M	0.18	10M	40	E	44M	T	
2N993	G	P		2N3250	SH	200M	A	150	15	6.0	45	140	0.2	20M	40	E	100M	T	
2N994	G	P		2N996	AH	360M	A	200	20	15	35	140	0.2	20M	40	E	100M	T	
2N995	S	P		2N996	AH	360M	A	200	20	15	35	140	0.2	20M	40	E	100M	T	
2N995A	S	P		2N998	AH	360M	A	200	15	12	35	140	0.3	60M	40	E	100M	T	
2N996	S	P		2N998	A	500M	A	175	75	40	35	100*	1.6	100M	10	E	7.0M	E	
2N997	S	N		2N998	AL	500M	A	200	100	60	40	10M	1.2	50M	10	E	7.0M	E	
2N998	S	N		2N998	AL	500M	A	200	60	60	40	10M	1.6	100M	10	E	7.0M	E	
2N999	S	N		2N998	S	150M	A	100	40	25	40	10M	0.25	100M	10	E	7.0M	E	
2N1000	G	P		2N1003	AH	120M	A	100	35	20	40	10M	0.25	100M	10	E	7.0M	E	
2N1003	G	P		2N1004	AH	120M	A	100	35	20	40	10M	0.25	100M	10	E	7.0M	E	
2N1004	G	P		2N1005	AH	120M	A	100	35	20	40	10M	0.25	100M	10	E	7.0M	E	
2N1005	S	N	2N2242	2N2242	A	150M	A	175	15	15	10	25	0.6	10M	25	E	60K	T	
2N1006	S	N	2N2242	2N2242	A	150M	A	175	15	15	25	150	0.6	10M	25	E	60K	T	
2N1007	G	P	2N1008	2N1008	AP	35W	C	95	25	20	10	250	1.0	2.0A	40	E	7.5K	E	
2N1008	G	P		2N1008	A	0.3W	C	85	20	15	10	250	1.0	2.0A	40	E	7.5K	E	
2N1008A	G	P		2N1008	A	0.3W	C	85	40	35	10	250	1.0	2.0A	40	E	7.5K	E	
2N1008B	G	P		2N1008	A	0.3W	C	85	60	55	10	250	1.0	2.0A	40	E	7.5K	E	
2N1009	G	P		2N1008	A	0.4W	C	85	35	35	10	250	1.0	2.0A	40	E	7.5K	E	
2N1010	G	P		2N1011	A	20M	A	55	10	10	10	250	1.0	2.0A	40	E	7.5K	E	
2N1011	G	P		2N1011	AP	35W	C	95	80	80	30	75	3.0A	1.5	3.0A	20	E	5.0K	E
2N1012	G	P		2N1012	S	150M	A	100	40	22	40	100M	0.2	100M	20	E	5.0K	E	
2N1014	G	P		2N3713	2N3713	SP	150W	C	150	100	65	20	50	4.0A	0.8	4.0A	20	E	0.5M
2N1015	S	N	2N3713	2N3713	SP	150W	C	150	30	30	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1015A	S	N	2N3713	2N3713	SP	150W	C	150	60	60	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1015B	S	N	2N5758	2N5758	SP	150W	C	150	100	100	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1015C	S	N	2N5760	2N5760	SP	150W	C	150	150	150	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1015D	S	N	MJ410	MJ410	SP	150W	C	150	200	200	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1015E	S	N	MJ411	MJ410	SP	150W	C	150	250	250	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1015F	S	N	MJ411	MJ410	SP	150W	C	150	300	300	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016	S	N	2N3713	2N3713	SP	150W	C	150	30	30	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016A	S	N	2N3713	2N3713	SP	150W	C	150	60	60	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016B	S	N	2N3713	2N3713	SP	150W	C	150	100	100	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016C	S	N	2N5758	2N5758	SP	150W	C	150	150	150	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016D	S	N	2N5760	2N5760	SP	150W	C	150	200	200	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016E	S	N	MJ3430	MJ3430	SP	150W	C	150	250	250	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1016F	S	N	MJ3430	MJ3430	SP	150W	C	150	300	300	10	250	2.0A	5.0A	10	E	0.5M	E	
2N1017	G	P	2N1021	2N1021	S	200M	A	100	30	6.0	10	70	2.6	200M	15	E	20M	B	
2N1018	G	P		2N1021	AP	50W	C	95	100	100	23	70	1.0A	1.0	5.0A	200K	T		
2N1021	G	P		2N1021	AP	50W	C	100	100	50	30	90	5.0A	0.5	5.0A	200K	T		
2N1021A	G	P		2N1021	AP	50W	C	95	120	120	23	70	5.0A	1.0	5.0A	200K	T		
2N1022	G	P		2N3323	2N3323	A	120M	A	100	40	40	20	175	1.5M	5.0A	9.0	E	1.0M	B
2N1022A	G	P		2N3323	2N3323	A	120M	A	100	40	40	20	175	1.5M	5.0A	9.0	E	1.0M	B
2N1023	S	P	2N3250	2N3250	A	0.25W	A	175	18	15	10	250	2.0A	5.0A	18	E	2.0M	B	
2N1024	S	P	2N3250	2N3250	A	0.25W	A	175	40	35	10	250	2.0A	5.0A	18	E	4.0M	B	
2N1025	S	P	2N3250	2N3250	A	0.25W	A	175	40	35	10	250	2.0A	5.0A	18	E	4.0M	B	
2N1026	S	P	2N3250	2N3250	A	0.25W	A	175	18	15	10	250	2.0A	5.0A	9.0	E	7.2M	T	
2N1027	S	P	2N3250	2N3250	A	0.25W	A	175	18	15	10	250	2.0A	5.0A	9.0	E	7.2M	T	
2N1028	S	P	2N1553	2N1539	A	0.25W	A	175	12	10	20	60	10A	1.0	10A	10	E	2.0K	E
2N1029	G	P	2N1553	2N1539	AP	90W	C	100	50	20	20	60	10A	1.0	10A	25	E	2.0K	E
2N1029A	G	P	2N1554	2N1539	AP	90W	C	100	60	30	20	60	10A	1.0	10A	25	E	2.0K	E
2N1029B	G	P	2N1555	2N1539	AP	90W	C	100	90	60	20	60	10A	1.0	10A	25	E	2.0K	E
2N1029C	G	P	2N1556	2N1539	AP	90W	C	100	100	70	20	60	10A	1.0	10A	25	E	2.0K	E
2N1030	G	P	2N1557	2N1539	AP	90W	C	100	50	20	50	100	10A	1.0	10A	10	E	2.0K	E
2N1030A	G	P	2N1558	2N1539	AP	90W	C	100	60	30	50	100	10A	1.0	10A	10	E	2.0K	E
2N1030B	G	P	2N1559	2N1539	AP	90W	C	100	90	60	50	100	10A	1.0	10A	10	E	2.0K	E
2N1030C	G	P	2N1560	2N1539	AP	90W	C	100	100	70	50	100	10A	1.0	10A	10	E	2.0K	E
2N1031	G	P	2N1553	2N1539	AP	90W	C	100	50	30	20	60	10A	1.0	10A	10	E	2.0K	E
2N1031A	G	P	2N1554	2N1539	AP	90W	C	100	60	40	20	60	10A	1.0	10A	10	E	2.0K	E
2N1031B	G	P	2N1555	2N1539	AP	90W	C	100	90	70	20	60	10A	1.0	10A	10	E	2.0K	E
2N1031C	G	P	2N1556	2N1539	AP	90W	C	100	100	80	20	60	10A	1.0	10A	10	E	2.0K	E
2N1032	G	P	2N1038	2N1038	AP	90W	C	100	50	30	50	100	10A	1.0	10A	25	E	2.0K	E
2N1032A	G	P		2N1038	AP	90W	C	100	60	40	50	100	10A	1.0	10A	25	E	2.0K	E
2N1032B	G	P		2N1038	AP	90W	C	100	80	70	50	100	10A	1.0	10A	25	E	2.0K	E
2N1032C	G	P		2N1038	AP	90W	C	100	100	80	50	100	10A	1.0	10A	25	E	2.0K	E
2N1034	S	P		2N1038	A	250M	A	160	50	40	20	60	10A	0.5	8.0M	9.0	E	150K	B
2N1035	S	P		2N1038	A	250M	A	160	50	35	20	60	10A	0.4	8.0M	18	E	200K	B
2N1036	S	P		2N1038	A	250M	A	160	50	30	20	60	10A	0.3	8.0M	34	E	300K	B
2N1037	S	P		2N1038	A	250M	A	160	50	35	20	60	10A	0.5	8.0M	9.0	E	150K	B
2N1038	G	P		2N1038	AP	20W	C	95	40	40	20	60	1.0A	0.25	1.0A	18	E	8.0K	E
2N1039	G	P		2N1038	AP	20W	C	95	60	60	20	60	1.0A	0.25	1.0A	18	E	8.0K	E
2N1040	G	P		2N1038	AP	20W	C	95	80	80	20	60	1.0A	0.25	1.0A	18	E	8.0K	E
2N1041	G	P	2N1042	2N1038	AP	20W	C	95	100	100	20	60	1.0A	0.25	1.0A	18	E	8.0K	E
2N1042	G	P		2N1042	AP	20W	C	100	40	40	20	60	3.0A	0.75	3.0A	2.0	E	250K	T
2N1043	G	P		2N1042	AP	20W	C	100	60	60	20	60	3.0A	0.25	1.0A	250K	T		
2N1044	G	P		2N1042	AP	20W	C	100	80	80	20	60	3.0A	0.25	1.0A	250K	T		
2N1045	G	P		2N1042															



**2N1049-2N136A**

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS											
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> -- (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> --	Subscript	f <sub>T</sub> -- Units	Subscript			
												(min)	(max)	Units	(volts)					Units		
2N1049	S	N	2N4912		AP	40W	C	200	80		30	90	500M	7.5	500M							
2N1049A	S	N	2N4912		AP	40W	C	200	80	80	0	30	90	500M	7.5	500M				75K	E	
2N1049B	S	N	2N4912		AP	40W	C	200	80	80	0	30	90	500M	2.0	500M				125K	E	
2N1049C	S	N	2N4912		AP	40W	C	200	80	80	0	30	90	500M	1.0	500M				125K	E	
2N1050	S	N	2N5759		AP	40W	C	200	120		30	90	500M	7.5	500M							
2N1050A	S	N	2N5759		AP	40W	C	200	120	120	0	30	90	500M	7.5	500M				75K	E	
2N1050B	S	N	2N5759		AP	40W	C	200	120	120	0	30	90	500M	2.0	500M				125K	E	
2N1050C	S	N	2N5759		AP	40W	C	200	120	80	0	30	90	500M	1.0	500M				125K	E	
2N1051	S	N	2N2218	2N2218	AH	0.5W	A	150	40	0	25	50M	3.0	50M				30	E	80M	T	
2N1052	S	N	2N2218	2N2218	AH	6.0M	A	200	200	200	V	20	80	0.2A	5.0	0.2A			15	E	8.0M	T
2N1054	S	N	2N2218	2N2218	AH	0.8W	A	200	125	115	0	20	80	0.2A						3.0M	T	
2N1055	S	N	2N2218	2N2218	AH	5.5M	A	200	100	100	0	20	80	50M	2.0	50M						
2N1056	G	P	2N2043	2N2042	A	240M	A	100	70	50	18	43	20M	0.13	20M					500K	B	
2N1057	G	P	2N1924	2N1924	A	240M	A	100	45	45	34	90	20M	0.13	20M			10	B	500K	B	
2N1058	G	N			A	50M		75	20	20										4.0M	E	
2N1059	G	N			A	180M		75	40	15			10M									
2N1060	G	P	2N2501	2N2501	SH	0.25W	A	150	40	0	17	80	5.0M	0.3	5.0M							
2N1065	G	P			A	0.12W	A	85	40	20	0	20	80		0.25	10M				10M	T	
2N1066	G	P	2N3323	2N3323	AH	120M	A	100	40	40	0	20	175	1.5M								
2N1067	S	N	2N4237	2N4237	SP	5.0W	C	175	60	30	0	15	75	200M	2.0	200M				0.75M	B	
2N1068	S	N	2N4237	2N4237	SP	10W	C	175	60	30	0	15	75	750M	2.0	200M				0.75M	B	
2N1069	S	N	2N5067	2N5067	SP	50W	C	175	60	45	0	20	50	1.5A	1.33	0.5A				0.5M	B	
2N1070	S	N	2N5067	2N5067	SP	50W	C	175	60	45	0	20	50	1.5A	0.5	1.5A				0.5M	B	
2N1072	S	N	2N3766	2N3766	SP	2.0W	A	150	75	30	0	20		0.75A	2.0	0.75A						
2N1073	G	P		2N1073	AP			110	40	40	R	20	60	5.0A	1.0	5.0A						
2N1073A	G	P		2N1073	AP			110	80	80	R	20	60	5.0A	1.0	5.0A						
2N1073B	G	P		2N1073	AP			110	120	120	R	20	60	5.0A	1.0	5.0A						
2N1074	S	N	2N2218	2N2218	A	250M	A	160	50	40	0									200K	B	
2N1075	S	N	2N2218	2N2218	A	250M	A	160	50	35	0							18	E	250K	B	
2N1076	S	N	2N2218	2N2218	A	250M	A	160	50	30	0							36	E	300K	B	
2N1077	S	N	2N2218	2N2218	A	250M	A	160	50	35	0							9.0	E	200K	B	
2N1078	G	P			AP	20W	C	85	60	60	S	40		0.5A	1.0	1.0A						
2N1079	S	N	2N5068	2N5067	AHP	60W	C	200	60	60	S	20	80	1.0A	3.0	1.0A			20	E	10M	T
2N1080	S	N	2N4914	2N4913	AHP	60W	C	200	60	60	S	20	80	2.0A	5.0	2.0A			20	E	10M	T
2N1081	S	N	2N2221	2N2218	S	6.0M	A	200	40	40	0	20	100	0.5A	4.0	0.5A						
2N1082	S	N	2N2221	2N2218	AH	0.2W	A	200	25	25	S	10	50	10M				10	E	17M	T	
2N1086	G	N			AH	65M	A	85	9.0	9.0	0	17	195	1.0M								
2N1086A	G	N			AH	65M	A	85	9.0	9.0	0	17	195	1.0M								
2N1087	G	N			AH	65M	A	85	9.0	9.0	0	17	195	1.0M								
2N1090	G	N			S	120M	A	85	25		30			0.2	20M					5.0M	B	
2N1091	G	N			S	120M	A	85	25		30			0.3	200M					10M	B	
2N1092	S	N	2N4237	2N4237	SP	2.0W	A	175	60	30	0	15	75	200M	2.0	200M				0.75M	B	
2N1093	G	P			A	150M	A	95	30	15	0	50	150	20M	0.2	20M			0.96	E	5.0M	B
2N1094	G	P			AH	0.15W	A	100	30	15	0	15		4.0M						560M	T	
2N1097	G	P	2N1414	2N1413	A	200M	A	100	18	18	R	34	90	20M						1.0M	B	
2N1098	G	P	2N1414	2N1413	A	200M	A	100	18	18	R	25	90	20M						1.0M	B	
2N1099	G	P		2N277	AP	50W	C	95	80	70	S	35	70	5.0A	0.7	12A						
2N1100	G	P		2N173	AP	50W	C	95	100	65	0	25	50	5.0A	0.7	12A						
2N1101	G	N			A	180M		75	20	15	R	25	50	35M	0.5	100M					10K	E
2N1102	G	N			A	180M		75	40	25	R	25	50	35M	0.5	100M					10K	E
2N1103	S	N	2N2221	2N2218	A	125M	A	150	45	35	0	30	65	10M	1.5	10M			20	E	10M	B
2N1104	S	N	2N2221	2N2218	A	125M	A	150	45	35	0	45	150	10M	1.5	10M			40	E	20M	B
2N1105	S	N	MM3005	MM3005	A	800M	A	200	60	60	0	12	36	200M	5.0	200M						
2N1106	S	N	MM3007	MM3005	A	800M	A	200	100	100	0	12	36	200M	5.0	200M						
2N1107	G	P			AH	30M	C		16											40M	B	
2N1108	G	P			AH	30M	C		16											35M	B	
2N1109	G	P			AH	30M	C		16											35M	B	
2N1110	G	P			AH	30M	C		16											35M	B	
2N1111	G	P			AH	30M	C		16											35M	B	
2N1114	G	N			S	150M		100	25	15	R	40	180	20M						7.0M	B	
2N1115	G	P			S	150M	A	85	20	15	0			0.35	60M					5.0M	B	
2N1115A	G	P			S	150M	A	85	20	15	0			0.35	60M					5.0M	B	
2N1116	S	N	MM3005	MM3005	AH	600M	C	200	60	60	0	40	150	0.5A	5.0	0.5A					6.0M	T
2N1117	S	N	MM3005	MM3005	AH	600M	C	200	60	60	0	40	150	0.2A	4.0	0.2A					4.0M	T
2N1118	S	P	2N3250	2N3250	AH	150M	A	140	25	25	U							15	E	8.0M	M	
2N1118A	S	P	2N3250	2N3250	AH	150M	A	140	25	25	U							15	E	8.0M	M	
2N1119	S	P	2N3546	2N3546	S	150M	A	140	10	10	U	15		15M	0.15	5.0M				7.2M	T	
2N1120	G	P		2N1120	AP	45W	C	95	80	70	S	20	50	10A	1.0	10A			30	E	3.0K	E
2N1121	G	N			AH	65M	C	85	15	15	0	34		1.0M								
2N1122	G	P	2N961	2N956	SH	25M	A	100	12	11	S	25		10M	0.1	8.0M			35	E	40M	
2N1122A	G	P	2N960	2N956	SH	25M	A	100	15	14	S	25		10M	0.1	8.0M			35	E	40M	
2N1123	G	P	2N3427	2N3427	SH	10M	C	100	45	40	S	40		100M	0.2	10M					3.0M	B
2N1124	G	P	2N651	2N650	A	300M	A	85	40	35	V			0.2	100M			40	E		400K	B
2N1125	G	P	2N651	2N650																		



2N1136B-2N1201

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)					Units	Units
2N1136B	G	P	2N742	2N742	AP		100	100	75	R	50	100	3.0A	1.0	3.0A			4.0K	E	
2N1137	G	P		2N1141	AH	750M	C	100	35	25	S	10	10M	2.0	50M	0.94	B	500M	T	
2N1137A	G	P		2N1141	AH	750M	C	100	30	25	S	15	10M	2.0	50M	0.98	B	600M	T	
2N1137B	G	P		2N1141	AH	750M	C	100	30	25	S	15	10M	2.0	50M	0.94	B	400M	T	
2N1138	G	P		2N1141	AH	750M	C	100	60	25	O	100	200	3.0A	1.0	3.0A				
2N1138A	G	P		2N1141	AH	750M	C	100	90	55	O	100	200	3.0A	1.0	3.0A				
2N1138B	G	P		2N1141	AH	750M	C	100	100	65	O	100	200	3.0A	1.0	3.0A				
2N1139	S	N		2N742	2N742	SH	6.6M	A	175	15	15	O	20	200	10M	0.7	10M		100M	T
2N1141	G	P		2N742	2N1141	SH	750M	C	100	35	25	S	10	10M	2.0	50M	0.94	B	500M	T
2N1141A	G	P		2N742	2N1141	AH	750M	C	100	35	25	S	15	10M	2.0	50M	0.98	B	600M	T
2N1142	G	P		2N1141	AH	750M	C	100	30	25	S	15	10M	2.0	50M	0.94	B	400M	T	
2N1143	G	P	2N321 2N1414	2N1141	AH	750M	C	100	25	10	15	10M	2.0	50M	0.98	B	480M	T		
2N1143A	G	P		2N319	AH	750M	C	100	30	25	S	15	10M	2.0	50M	0.94	B	400M	T	
2N1144	G	P		2N319	A	175M	A	85	16	16	R	34	90	20M				1.0M	B	
2N1145	G	P		2N1413	A	175M	A	85	16	16	R	25	90	20M				1.0M	B	
2N1146	G	P			SP	87W	C	95	40	20	O	60	150	5.0A	1.0	15A		0.15M	E	
2N1146A	G	P			SP	87W	C	95	60	30	O	60	150	5.0A	1.0	15A		0.15M	E	
2N1146B	G	P			SP	87W	C	95	80	40	O	60	150	5.0A	1.0	15A		0.15M	E	
2N1146C	G	P			SP	87W	C	95	100	50	O	60	150	5.0A	1.0	15A		0.15M	E	
2N1147	G	P			SP	87W	C	95	40	20	O	60	150	5.0A	1.0	15A		0.15M	E	
2N1147A	G	P			SP	87W	C	95	60	30	O	60	150	5.0A	1.0	15A		0.15M	E	
2N1147B	G	P		SP	87W	C	95	80	40	O	60	150	5.0A	1.0	15A		0.15M	E		
2N1147C	G	P		SP	87W	C	95	100	50	O	60	150	5.0A	1.0	15A		0.15M	E		
2N1149	S	N	2N2221	2N2218	A	150M	A	175	45		9.0	20	25M			0.9	B	4.0M	B	
2N1150	S	N	2N2221	2N2218	A	150M	A	175	45		18	40	25M			0.948	B	5.0M	B	
2N1151	S	N	2N2221	2N2218	A	150M	A	175	45		18	90	25M			0.948	B	8.0M	B	
2N1152	S	N	2N2221	2N2218	A	150M	A	175	45		36	90	25M			0.973	B	6.0M	B	
2N1153	S	N	2N2221	2N2218	A	150M	A	175	45		76	333	25M			0.987	B	7.0M	B	
2N1154	S	N	2N2221	2N2218	A	750M	C	150	50		9.0	60M				0.9	B			
2N1155	S	N	2N2221	2N2218	A	750M	C	150	80		9.0	50M				0.9	B			
2N1156	S	N	2N2221	2N2218	A	750M	C	150	120		9.0	40M				0.9	B			
2N1157	G	P	MP501	MP500	SP	187W	J	100	60	45	O	38	84	10A	0.8	40A		75K	T	
2N1157A	G	P	MP502	MP500	SP	187W	J	100	80	50	O	38	84	10A	0.8	40A		75K	T	
2N1158	G	P	2N1143	2N1141	AH	60M	A	100	20	20	S						5.7	E		
2N1158A	G	P	2N1142	2N1141	AH	75M	A	100	20	20	S						9.0	E		
2N1159	G	P	2N3616	2N3615	SP	35W	C	95	80	60	O	30	75	3.0A	1.0	3.0A				
2N1160	G	P	2N3616	2N3615	SP	35W	C	95	80	60	O	20	50	5.0A	1.0	5.0A				
2N1162	G	P		2N1162	SP	90W	C	100	50	35	S	15	65	25A	0.8	25A		1.0K	E	
2N1162A	G	P		2N1162	SP	90W	C	100	50	35	S	15	65	25A	0.8	25A		3.0K	E	
2N1163	G	P		2N1162	SP	90W	C	100	50	35	S	15	65	25A	0.8	25A		1.0K	E	
2N1163A	G	P		2N1162	SP	90W	C	100	50	35	S	15	65	25A	0.8	25A		3.0K	E	
2N1164	G	P		2N1162	SP	90W	C	100	80	60	S	15	65	25A	0.8	25A		1.0K	E	
2N1164A	G	P		2N1162	SP	90W	C	100	80	60	S	15	65	25A	0.8	25A		3.0K	E	
2N1165	G	P		2N1162	SP	90W	C	100	80	60	S	15	65	25A	0.8	25A		1.0K	E	
2N1165A	G	P		2N1162	SP	90W	C	100	80	60	S	15	65	25A	0.8	25A		3.0K	E	
2N1166	G	P		2N1162	SP	90W	C	100	100	75	S	15	65	25A	0.8	25A		1.0K	E	
2N1166A	G	P		2N1162	SP	90W	C	100	100	75	S	15	65	25A	0.8	25A		3.0K	E	
2N1167	G	P		2N1162	SP	90W	C	100	100	75	S	15	65	25A	0.8	25A		1.0K	E	
2N1167A	G	P		2N1162	SP	90W	C	100	100	75	S	15	65	25A	0.8	25A		3.0K	E	
2N1168	G	N	2N3614	2N3611	AP	45W	C	95	50	30	R									
2N1169	G	N			S	120M	A	71	40	20	O	20		200M	0.3	200M		4.5M	B	
2N1170	G	N			S	120M	A	71	40	20	O	20		200M	0.3	200M		4.5M	B	
2N1171	G	P			S	170M	A	85	30	12	O	30		30M				10M	B	
2N1172	G	P	2N2137	2N2137	SP			95	40	30	O	30	90	100M						
2N1173	G	N			S	0.25W	A	100	35	20	O	50	200	10M	0.075	10M	50	E		
2N1174	G	P			S	0.25W	A	100	35	20	O	50	200	10M	0.075	10M	50	E		
2N1175	G	P		2N1413	A	200M	A	85	35	25	R	70	140	20M				1.5M	B	
2N1176	G	P	2N1189	2N1189	A	0.3W	C	85	10	10	R				0.3	0.1A	20	E		
2N1177	G	P	2N2957	2N2955	AH	80M	A	71	30											
2N1178	G	P	2N2955	2N2955	AH	80M	A	71	30											
2N1179	G	P	2N2956	2N2955	AH	80M	A	71	30											
2N1180	G	P	2N2956	2N2955	AH	80M	A	71	30											
2N1182	G	P	2N2140	2N2137	SP	106W	C	100	50	60	O	30	85	400M	0.5	2.0A		5.0K	E	
2N1183	G	P	2N2140	2N2137	SP	7.5W	C	100	45	20	O	20	60	400M	0.5	400M		500K	B	
2N1183A	G	P	2N2140	2N2137	SP	7.5W	C	100	60	30	O	20	60	400M	0.5	400M		500K	B	
2N1183B	G	P	2N2141	2N2137	SP	7.5W	C	100	80	40	O	20	60	400M	0.5	400M		500K	B	
2N1184	G	P	2N2144	2N2137	SP	7.5W	C	100	45	20	O	40	120	400M	0.5	400M		500K	B	
2N1184A	G	P	2N2145	2N2137	SP	7.5W	C	100	60	30	O	40	120	400M	0.5	400M		500K	B	
2N1184B	G	P	2N2146	2N2137	SP	7.5W	C	100	80	40	O	40	120	400M	0.5	400M		500K	B	
2N1185	G	P		2N1185	A	200M	A	100	45	30	R	130		10M			190	E		
2N1186	G	P		2N1185	A	200M	A	100	60	45	R	33		10M			30	E		
2N1187	G	P		2N1185	A	200M	A	100	60	45	R	45		10M			50	E		
2N1188	G	P		2N1185	A	200M	A	100	60	45	R	80		10M			100	E		
2N1189	G	P		2N1189	A	200M	A	100	45	30	R	60		10M	0.22	50M	75	E		
2N1190	G	P		2N1189	A	200M	A	100	45	30	R	100		10M	0.22	50M	125	E		
2N1191	G	P		2N1191	A	200M	A	100	40	25	R	20	80	10M			30	E		
2N1192	G	P		2N1191	A	200M	A	100	40	25	R	40	135	10M			50	E		
2N1193	G	P		2N1191	A	200M	A	100												



## 2N1202-2N1291

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Re Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units						(volts)	Units
2N1202	G	P	2N2145	2N2137	SP	34W	J	95	80	60	0	40	120	500M	0.3	500M			200K	T
2N1203	G	P	2N2146	2N2137	SP	34W	J	95	120	70	0	25	75	2.0A	0.6	2.0A			200K	T
2N1204	G	P		2N1204	SH	200M	A	100	20	15	0	15		400M	0.5	200M			220M	T
2N1204A	G	P		2N1204	SH	200M	A	100	20	15	0	25		200M	0.4	200M			220M	T
2N1206	S	N	2N3020	2N3019	AH	3.0W	A	200	60	60	0	20	80					10M	T	
2N1207	S	N	2N3500	2N3498	AH	3.0W	A	200	125	125	0	20	80					10M	T	
2N1208	S	N	2N5477	2N5477	AP	45W	C	200	60	60	0	15		2.0A	5.0	2.0A				
2N1209	S	N	2N5477	2N5477	AHP	45W	C	200	45	45	0	20	80	2.0A	5.0	2.0A			3.0M	T
2N1210	S	N	2N4232	2N4321	AHP	30W	C	175	60	60	0	15	75	2.0A	2.0	2.0A			3.0M	T
2N1211	S	N	2N4233	2N4321	AHP	30W	C	175	80	80	V	15	75	2.0A	2.0	2.0A			3.0M	T
2N1212	S	N	2N5477	2N5477	AHP	45W	C	200	60	60	0	12	36	1.0A	5.0	1.0A			3.0M	T
2N1213	G	P			SH	75M	A	71	25											
2N1214	G	P			SH	75M	A	71	25											
2N1215	G	P			SH	75M	A	71	25											
2N1216	G	P			SH	75M	A	85	20	20	0	40	100	500*	1.0	1.0A			6.0M	B
2N1217	G	N			SH	75M	A	85	20	20	0	30	120	1.0A					7.0K	B
2N1218	G	N			AP	20W	C	90	45	45	R	18		5.0M					5.0M	B
2N1219	S	P	2N3250	2N3250	A	0.25W	A	175	30	25	0	9.0		5.0M					2.0M	B
2N1220	S	P	2N3250	2N3250	A	0.25W	A	175	30	25	0			5.0M					2.0M	B
2N1221	S	P	2N3250	2N3250	A	0.25W	A	175	30	25	0								2.0M	B
2N1222	S	P	2N3250	2N3250	A	0.25W	A	175	30	25	0									
2N1223	S	P	2N3250	2N3250	A	0.25W	A	175	40	40	0									
2N1224	G	P			SH	120M	A	85	40											
2N1225	G	P			AH	120M	A	85	60											
2N1226	G	P	2N3611	2N3611	AH	120M	A	85	35	20	0	50	350	0.5A	0.8	1.5A			3.0K	E
2N1227	G	P	2N2904	2N2904	S	0.4W	A	160	15	15	0				0.2	10M				
2N1228	G	P	2N2904	2N2904	S	0.4W	A	160	15	15	0				0.2	10M				
2N1229	S	P	2N2904	2N2904	S	0.4W	A	160	35	35	0				0.2	10M				
2N1230	S	P	2N2904	2N2904	S	0.4W	A	160	35	35	0				0.2	10M				
2N1231	S	P	2N2904	2N2904	S	0.4W	A	160	60	60	0				0.2	10M				
2N1232	S	P	2N2905A	2N2904	S	0.4W	A	160	60	60	0				0.2	10M				
2N1233	S	P	2N2905A	2N2904	S	0.4W	A	160	60	60	0				0.2	10M				
2N1234	S	P	2N3495	2N3494	S	0.4W	A	160	110	110	0				0.2	10M				
2N1235	S	N	2N5759		AP	85W	C	200	120	120	R	12	60	1.0A	5.0	1.0A			50K	E
2N1238	S	P	2N3467	2N3467	S	1.0W	A	160	15	15	0				0.2	10M				
2N1239	S	P	2N3467	2N3467	S	1.0W	A	160	15	15	0				0.2	10M				
2N1240	S	P	2N3467	2N3467	S	1.0W	A	160	35	35	0				0.2	10M				
2N1241	S	P	2N3467	2N3467	S	1.0W	A	160	35	35	0				0.2	10M				
2N1242	S	P	2N3763	2N3763	S	1.0W	A	160	60	60	0				0.2	10M				
2N1243	S	P	2N3763	2N3763	S	1.0W	A	160	60	60	0				0.2	10M				
2N1244	S	P			S	1.0W	A	160	110	110	0				0.2	10M				
2N1245	G	P			AP	20W	C	85	30	25	R	50		0.5A						
2N1246	G	P			AP	20W	C	85	30	25	R	50		0.5A						
2N1247	S	N	2N2222	2N2219	A	30M	A	150	6.0	6.0	0	15		5.0*						
2N1248	S	N	2N2222	2N2219	A	30M	A	150	6.0	6.0	0	15		20*						
2N1249	S	N	2N2222	2N2219	A	30M	A	150	6.0	6.0	0	20		30*						
2N1250	S	N	2N4914	2N4913	AP	85W	C	200	60	60	0	15		2.0A	5.0	2.0A				
2N1251	G	N			A	150M	A	85	20	15	R				0.5	100M			7.5K	E
2N1252	S	N	2N2537	2N2537	S	600M	A	175	30	20	R	15	45	150M	1.5	150M			40M	T
2N1252A	S	N	2N2537	2N2537	S	800M	A	300	60	30	R	15	45	150M	1.5	150M			40M	T
2N1253	S	N	2N2537	2N2537	S	600M	A	175	30	20	R	30	90	150M	1.5	150M			50M	T
2N1253A	S	N	2N2537	2N2537	S	800M	A	300	60	30	R	30	90	150M	1.5	150M			50M	T
2N1254	S	P	MM869B	2N869A	SH	275M	A	200	30	30	0	25	50	10M	0.3	10M			30M	T
2N1255	S	P	MM869B	2N869A	SH	275M	A	200	30	30	0	40	80	10M	0.3	10M			50M	T
2N1256	S	P			SH	275M	A	200	40	40	0	25	50	10M	0.3	10M			30M	T
2N1257	S	P			SH	275M	A	200	40	40	0	40	80	10M	0.3	10M			50M	T
2N1258	S	P	MM869B	2N869A	SH	275M	A	200	30	30	0	75	150	10M	0.6	10M			50M	T
2N1259	S	P			SH	275M	A	200	50	50	0	25	100	10M	0.3	10M			40M	T
2N1260	S	N	2N5479	2N5477	AP	85W	C	200	120	120	R	12	60	1.0A	10	1.0A			50K	E
2N1261	G	P	2N1531	2N1529	SP	34W	J	95	80	45	0	20	50	2.0A	0.6	2.0A			200K	T
2N1262	G	P	2N1531	2N1529	SP	34W	J	95	80	45	0	30	75	2.0A	0.6	2.0A			200K	T
2N1263	G	P	2N3617	2N3615	AP	34W	J	95	80	45	0	45	113	2.0A	0.6	2.0A				
2N1264	G	P	2N1191	2N1191	AH	50M	A	75	20		R									
2N1265	G	P	2N1192	2N1191	AH	50M	A	85	12	10	R				0.5	100M			600K	B
2N1266	G	P	2N1191	2N1191	AH	80M	A	85	10											
2N1267	S	N	2N2481	2N2481	AH	150M	A	150	20	15	0	4.0	16	1.5M						
2N1268	S	N	2N2481	2N2481	AH	150M	A	150	20	15	0	7.0	30	1.5M						
2N1269	S	N	2N2481	2N2481	AH	150M	A	150	20	15	0	20	80	1.5M						
2N1270	S	N	2N2481	2N2481	AH	150M	A	150	20	15	0	4.0	16	1.5M						
2N1271	S	N	2N2481	2N2481	AH	150M	A	150	20	15	0	7.0	30	1.5M						
2N1272	S	N	2N2481	2N2481	AH	150M	A	150	20	15	0	20	80	1.5M						
2N1273	G	P			A	250M	A	100	15	15	R	27	165	50M	1.0	100M				
2N1274	G	P			AM	250M	A	100	25	25	R	27	165	50M	1.0	100M				
2N1275	S	P			A	250M	A	160	100	80	0	9.0	25	1.0M	0.3	5.0M			100K	B
2N1276	S	N	2N2501	2N2501	A	150M	A	150	40	30	0				1.0	5.0M			15M	B
2N1277	S	N	2N2501	2N2501	A	150M	A	150	40	30	0				1.0	5.0M			15M	B
2N1278	S	N	2N2501	2N2501	A															



2N1292-2N1382

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub> Units	Subscript		
											(min)	(max)	Units	(volts)					Units	
2N1292	G	N	2N1531	2N1529	AP	25W	C	100	35	30	S	30	0.5A	1.0	1.0A					
2N1293	G	N			AP	20W	C	85	60	60	S	40	0.5A	1.0	1.0A					
2N1294	G	N			AP	25W	C	100	60	45	S	30	0.5A	1.0	1.0A					
2N1295	G	N			AP	20W	C	85	80	80	S	40	0.5A	1.0	1.0A					
2N1296	G	N	2N1533	2N1529	AP	25W	C	100	80	60	S	30	0.5A	1.0	1.0A					
2N1297	G	N			AP	20W	C	85	100	100	S	40	0.5A	1.0	1.0A					
2N1298	G	N			AP	25W	C	100	100	80	S	30	0.5A	1.0	1.0A					
2N1299	G	N			S	150M		100	40	20	R	35	50M	0.17	15M			4.0M	B	
2N1300	G	P	2N1192	2N1191	SH	150M	A	85	13	12	O	30	10M					25M	T	
2N1301	G	N			SH	150M	A	85	13	12	O	30	10M					35M	T	
2N1302	G	N			S	150M	A	85	25		S	20	10M	0.2	10M			3.0M	B	
2N1303	G	P			S	150M	A	85	30		S	20	10M	0.2	10M			3.0M	B	
2N1304	G	N	2N3611	2N3611	S	150M	A	85	25		S	40	200	10M	0.2	10M			5.0M	B
2N1305	G	N			S	150M	A	85	30		S	40	200	10M	0.2	10M			5.0M	B
2N1306	G	N			S	150M	A	85	25		S	60	300	10M	0.2	10M			10M	B
2N1307	G	N			S	150M	A	85	30		S	60	300	10M	0.2	10M			10M	B
2N1308	G	N	2N3611	2N3611	S	150M	A	85	25		S	80	10M	0.2	10M			15M	B	
2N1309	G	P			S	150M	A	85	30		S	80	10M	0.2	10M			15M	B	
2N1309A	G	P			S	0.15W	A	85	35	15	O	80	10M	0.2	10M			15M	B	
2N1310	G	N			AL	120M	A	85	90			20	5.0M							
2N1311	G	N	2N3611	2N3611	AL	120M	A	85	75	75		15	5.0M							
2N1312	G	N			S	120M	A	85	50	50		20	20M							
2N1313	G	P			S	0.18W	A	100	30	15	O	40	125	0.28	0.3A			6.0M	B	
2N1314	G	P			AP	125W	C	90	40	40	R	20	55	1.0A						
2N1315	G	P	2N3611	2N3611	AP	125W	C	90	32	16	S	45	135	1.0A						
2N1316	G	P			S	0.2W	A	85	30	15	O	50	200					10M	B	
2N1317	G	P			S	0.2W	A	85	20	12	O	45	180					10M	B	
2N1318	G	P			S	0.2W	A	85	10	6.0	O	40	150					10M	B	
2N1319	G	P	2N3611	2N3611	S	120M	A	71	20	20	V	15		0.4A	0.3	0.4A			3.0M	T
2N1320	G	P			AP	20W	C	85	35	30	S	40		0.5A	1.0	1.0A				
2N1321	G	N			AP	25W	C	100	35	30	S	30		0.5A	1.0	1.0A				
2N1322	G	P			AP	20W	C	85	60	60	S	40		0.5A	1.0	1.0A				
2N1323	G	N	2N3611	2N3611	AP	25W	C	100	60	45	S	30		0.5A	1.0	1.0A				
2N1324	G	P			AP	20W	C	85	80	80	S	40		0.5A	1.0	1.0A				
2N1325	G	N			AP	25W	C	100	80	60	S	30		0.5A	1.0	1.0A				
2N1326	G	P			AP	20W	C	85	100	100	S	40		0.5A	1.0	1.0A				
2N1327	G	N	2N3019	2N3019	AP	25W	C	100	100	80	S	30		0.5A	1.0	1.0A				
2N1328	G	P			AP	20W	C	85	35	30	S	40		0.5A	1.0	1.0A				
2N1329	G	N			AP	25W	C	100	35	30	S	30		0.5A	1.0	1.0A				
2N1330	G	N			AP	25W	C	100	60	45	S	30		0.5A	1.0	1.0A				
2N1331	G	P	2N3019	2N3019	AP	20W	C	85	80	80	S	40		0.5A	1.0	1.0A				
2N1332	G	N			AP	25W	C	100	80	60	S	30		0.5A	1.0	1.0A				
2N1333	G	P			AP	20W	C	85	100	100	S	40		0.5A	1.0	1.0A				
2N1334	G	N			AP	25W	C	100	100	80	S	30		0.5A	1.0	1.0A				
2N1335	S	N	2N3019	2N3019	AHP	0.8W	A	175	120	45	O	10	150	30M					70M	T
2N1336	S	N			AHP	0.8W	A	175	120	45	O	10	150	30M					70M	T
2N1337	S	N			AHP	0.8W	A	175	120	45	O	10	150	30M					70M	T
2N1338	S	N			AHP	0.8W	A	175	80	25	O	10	150	30M					70M	T
2N1339	S	N	2N3019	2N3019	AHP	0.8W	A	175	120	50	O	10	150	30M					70M	T
2N1340	S	N			AHP	0.8W	A	175	120	50	O	10	150	30M					70M	T
2N1341	S	N			AHP	0.8W	A	175	120	50	O	10	150	30M					70M	T
2N1342	S	N			AHP	0.8W	A	175	150	65	O	10	150	30M					70M	T
2N1343	G	P	2N651	2N650	S	0.15W	A	85	20	16	O	15		50M					4.0M	B
2N1344	G	P			S	0.15W	A	85	15	10	O	60		20M					7.0M	B
2N1345	G	P			S	0.15W	A	85	10	8.0	O	30	100	0.4A					10M	B
2N1346	G	P			S	0.15W	A	85	12	10	O	40	250	0.35M	0.13	12M			5.0M	B
2N1347	G	P	2N651	2N650	S	0.15W	A	85	20	12	O	30		10M	0.2	10M			10M	B
2N1352	G	P			S	0.15W	A	85	30	20	O	40	100							
2N1353	G	P			S	0.2W	A	85	15	10	O	25	150	10M	0.2	50M			1.5M	B
2N1354	G	P			S	0.2W	A	85	30	15	O	25	150	10M	0.2	50M			3.0M	B
2N1355	G	P	2N174	2N174	S	0.2W	A	85	30	20	O	30	150	10M	0.2	50M			5.0M	B
2N1356	G	P			S	0.2W	A	100	30	20	O	40	140	10M	0.2	50M			5.0M	B
2N1357	G	P			S	0.2W	A	85	30	15	O	40	150	10M	0.2	50M			10M	B
2N1358	G	P			SP	90W		95	80	40	O	80		1.2A	0.7	12A			100K	B
2N1358A	G	P	2N375	2N375	SP	150M	C	100	100	60	O	40	80	1.2A	0.7	12A			100K	B
2N1359	G	P			AP	90W	J	100	50	40	S	35	90	1.0A	0.1	2.0A			5.0K	E
2N1360	G	P			AP	90W	J	100	50	40	S	60	140	1.0A	1.0	2.0A			5.0K	E
2N1361	G	P			S	0.15W	A	100	25	20	O	40	100	25M					4.0M	B
2N1361A	G	P	2N375	2N375	S	0.2W	A	100	25	20	O	40	100	25M					4.0M	B
2N1362	G	P			AP	90W	J	100	100	75	S	35	90	1.0A	1.0	2.0A			5.0K	E
2N1363	G	P			AP	90W	J	100	100	75	S	60	140	1.0A	1.0	2.0A			5.0K	E
2N1364	G	P			AP	90W	J	100	120	100	S	35	90	1.0A	1.0	2.0A			5.0K	E
2N1365	G	P	2N375	2N375	AP	90W	J	100	120	100	S	60	140	1.0A	1.0	2.0A			5.0K	E
2N1366	G	N			A	100M	A	85	18	18	R	20		1.0M				5.0M	E	
2N1367	G	N	2N375	2N375	A	100M	A	85	18	18	R	10		1.0M				2.5M	T	
2N1370	G	P			A	250M	A	100	25	25	R	45	165	50M	1.0	100M				
2N1371	G	P	2N375	2N375	A	250M	A	100	45	45	R	45	165	50M	1.0	100M				
2N1372	G	P			A	250M	A	100	25	25	R	27	105	50M	1.0	100M				
2N1373	G	P	2N375	2N375	A	250M	A	100	45	45	R	27	105	50M	1.0	100M				
2N1374	G	P			A	250M	A	100	25	25	R	25	165	50M	1.0	100M				
2N1375	G	P	2N375	2N375	A	250M	A	100	45	45	R	45	165	50M	1.0	100M				
2N1376	G	P			A	250M	A	100	25	25	R	67	165	50M	1.0	100M				
2N1377	G	P	2N375	2N375	A	250M	A	100	45	45	R	67	165	50M	1.0	100M				
2N1378	G	P			A	250M	A	100	12	12	R	85	330	50M	1.0	100M				
2N1379	G	P	2N375	2N375	A	250M	A	100	25	25	R	85	330	50M	1.0	100M				
2N1380	G	P			A	250M	A	100	12	12	R	27	330	50M	1.0	100M				
2N1381	G	P	2N375	2N375	A	250M	A	100	25	25	R	27	330	50M	1.0	100M				
2N1382	G	P			A	250M	A	100	25	25	R	45	165	50M	1.0	100M				



2N1383-2N1470

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript			
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)					Units	Units	Units
2N1383	G	P			A	250M	100	25	25	R	27	165	50M	1.0	100M	20	E				
2N1384	G	P			SH	240M	85	30	30	O	20		200M						20M	T	
2N1385	G	P			SH	750M	100	25	10	O	10		10M						250M	T	
2N1386	G	P	2N2222	2N2218	S	300M	175	25	25	O	30	90	10M	0.6	5.0M						
2N1387	S	N	2N2222	2N2218	S	300M	175	30	30	O	20	40	10M	0.5	5.0M						
2N1388	S	N	2N2222	2N2218	AH	300M	175	45	25	O	15	55	10M			30	E		50M	B	
2N1389	S	N	2N2222	2N2218	AH	300M	175	50	50	O			10M	0.8	5.0M				24M	T	
2N1390	S	N	2N2222	2N2218	AH	300M	175	20	20	O	30	150	10M			10	E		20M	B	
2N1391	G	P			A	150M	100	25	18	O	40	160	20M			35	E		3.0M	E	
2N1392	G	P			AL	50M	85	20	20	R											
2N1393	G	P			AL	50M	85	20	10	R											
2N1394	G	P			AL	50M	85	10	6.0	R											
2N1395	G	P	2N2955	2N2955	AH	120M	100	40	40	O	50	175	1.5M						30M	B	
2N1396	G	P	2N3323	2N3323	AH	120M	100	40	40	O	50	175	1.5M						30M	B	
2N1397	G	P	2N3323	2N3323	AH	120M	100	40	40	O	50	175	1.5M						120M	B	
2N1398	G	P			AH	50M	85	30	20	O	10		0.5M	0.75	10M				140M	T	
2N1399	G	P			AH	50M	85	30	20	O	3.5		0.5M	0.75	10M				140M	T	
2N1400	G	P			AH	50M	85	30	20	O	5.0	12	0.5M	0.75	10M				100M	T	
2N1401	G	P			AH	50M	85	30	20	O	5.0		0.5M	0.75	10M				120M	T	
2N1402	G	P			AH	50M	85	30	20	O	3.5	12	1.5M	0.75	10M				100M	T	
2N1403	G	P			AH	250M	100	15	12	O	25	250	7.0M	0.75	10M				200M	T	
2N1404	G	P			S	150M	85	25						0.15	12M				4.0M	B	
2N1404A	G	P			S	150M	85	25	15	O	30	200	12M	0.15	12M				3.0M	T	
2N1405	G	P			AH	75M	100	30	20	O	10	200	2.0M			10	E		250M	T	
2N1406	G	P			AH	75M	100	30	20	O	10	200	2.0M						250M	T	
2N1407	G	P			AH	75M	100	30	20	O	10	200	2.0M			10	E		200M	T	
2N1408	G	P			S	150M	100	50	50	S	10					10	E				
2N1409	S	N	2N2537	2N2537	SH	600M	200	30	25	O	15	45	150M						200M	T	
2N1409A	S	N	2N2537	2N2537	SH	800M	200	30	25	O	15	45	150M						200M	T	
2N1410	S	N	2N2537	2N2537	SH	600M	200	45	30	O	39	90	150M						130M	T	
2N1410A	S	N	2N2537	2N2537	SH	800M	200	30	30	O	30	90	150M						130M	T	
2N1411	G	P	2N962	2N956	S	25M	85	5.0	5.0	S	20		50M	0.45	10M				25M	T	
2N1412	G	P			SP	70W	95	100	65	O	25	50	5.0A	0.7	12A						
2N1413	G	P			S	200M	85	35	25	R	25	42	20M			20	E		800K	B	
2N1414	G	P			S	200M	85	35	25	R	34	65	20M			30	E		1.0M	B	
2N1415	G	P			S	200M	85	35	25	R	53	90	20M			44	E		1.3M	B	
2N1416	G	P	2N1193	2N1191	A	100M	65		18	U						39	E				
2N1417	S	N			A	0.15W	150	15	15	O						30	E				
2N1418	S	N			A	0.15W	150	30	30	O						30	E				
2N1419	G	P	2N1164	2N1162	SP	87W	95	80	40	O	40	100	25A	0.7	25A						
2N1420	S	N			AH	600M	175	60	30	R	100	300	150M	1.5	150M				50M	T	
2N1420A	S	N	2N2219	2N2218	AH	800M	200	60	40	R	100	300	150M	1.5	150M				60M	T	
2N1421	S	N	2N5477	2N5477	AHP	30W	200	60	60	S	20	80	1.0A	3.0	1.0A	20	E		10M	T	
2N1422	S	N	2N5477	2N5477	AHP	30W	200	60	60	S	20	80	1.0A	3.0	1.0A	20	E		10M	T	
2N1423	S	N	2N5477	2N5477	AHP	60W	200	60	60	S	20	80	2.0A	5.0	2.0A	20	E		10M	T	
2N1424	S	N	2N5477	2N5477	AHP	60W	200	60	60	S	20	80	2.0A	5.0	2.0A	20	E		10M	T	
2N1425	G	P			A	80M	85	24								17	E		10M	B	
2N1426	G	P			A	80M	85	24											10M	B	
2N1427	G	P	2N962	2N956	SH	25M	100	6.0	6.0	S	20		50M	0.2	50M	40	E		50M	T	
2N1428	S	P	2N869	2N869	S	100M	140	6.0	6.0	O	12		5.0M	0.1	5.0M	25	E		16M	T	
2N1429	S	P	2N869	2N869	SP	100M	140	6.0	6.0	O	12		5.0M	0.1	5.0M	25	E		0.6M	T	
2N1430	G	P			A	70W	110	120	100	O	30	90	5.0A	0.4	10A				10K	E	
2N1431	G	P			A	180M	75	20	15	R	75	150	35M								
2N1432	G	P			A	100M	100	45	45	R	75					30	E				
2N1433	G	P			AP	95	80	50	50	O	20	50	2.0A	1.5	2.0A				5.0K	E	
2N1434	G	P			AP	95	80	50	50	O	45	115	2.0A	1.0	2.0A				5.0K	E	
2N1435	G	P			AP	95	80	50	50	O	30	75	2.0A	0.6	2.0A				5.0K	E	
2N1436	G	P			SH	50M	100	15	12	S	20		10M	0.2	10M						
2N1437	G	P			AP	23W	95	100	90	S	20		0.5A	1.0	1.0A				4.0K	E	
2N1438	G	P			AP	23W	95	100	90	S	20		0.5A	1.0	1.0A				4.0K	E	
2N1439	S	P	2N2907A	2N2904	A	0.4W	200	50	50	O				0.25	5.0M	9.0	E		0.5M	B	
2N1440	S	P	2N2907A	2N2904	A	0.4W	200	60	50	O				0.25	5.0M	9.0	E		1.0M	B	
2N1441	S	P	2N2907A	2N2904	A	0.4W	200	50	35	O				0.25	5.0M	18	E		1.0M	B	
2N1442	S	P	2N2907A	2N2904	A	0.4W	200	50	30	O				0.25	5.0M	30	E		1.0M	B	
2N1443	S	P	2N2907	2N2904	A	0.4W	200	50	15	O				0.25	5.0M	50	E		1.0M	B	
2N1444	S	N	2N2410	2N2910	SH	0.5W	150	60	20	O	20		0.25A	1.5	0.25A						
2N1445	S	N	2N3500	2N3498	AH	4.0W	200	120	120	O	20	80	200M	4.0	200M				75K	E	
2N1446	G	P	2N1191	2N1191	A	0.2W	85	45	25	O	16	45	20M			16	E		0.8M	B	
2N1447	G	P	2N1191	2N1191	A	0.2W	85	45	25	O	35	65	20M			30	E		1.5M	B	
2N1448	G	P	2N1192	2N1191	A	0.2W	85	45	25	O	50	90	20M			45	E		2.0M	B	
2N1449	G	P	2N1189	2N1189	A	0.2W	85	45	25	O	70	125	20M			60	E		2.5M	B	
2N1450	G	P	2N2955	2N2955	S	0.12W	85	30	20	O	20			0.25	10M						
2N1451	G	P	2N464	2N464	A	0.2W	85	45	20	O	20	65	20M								
2N1452	G	P	2N1191	2N1191	A	0.2W	85	45	20	O	30	90	2.0M								
2N1453	G	P			AP	90	30	20	20	O	40	90	1.0A	1.0	3.0A				5.0K	E	
2N1454	G	P			AP	90	30	20	20	O	70	150	1.0A	1.0	3.0A				5.0K	E	
2N1455	G	P			AP	90	60	40	40	O	40	90	1.0A	1.0	3.0A				5.0K	E	
2N1456	G	P			AP	90	60														



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE—</sub>	Subscript	f <sub>m</sub> Units	Subscript	
												(min)	(max)	Units	(volts)					Units
2N1471	G	P	2N834	2N834	S	200M	A	85	12	15	R	20		10M	0.25	10M	100	E	3.0M	B
2N1472	G	N			SH	150M	A	150	25	25	O	25							75M	T
2N1473	G	N			S	167M	A	75	40	20	O	25	50	400M					4.0M	B
2N1474	S	P	2N2906A	2N2904	A	0.25W	A	175	60	60	U						12	E	1.0M	T
2N1474A	S	P	2N2906A	2N2904	A	0.25W	A	175	60	60	U						18	E	2.0M	B
2N1475	S	P	2N2906A	2N2904	A	0.25W	A	175	60	60	U						36	E	1.0M	B
2N1476	S	P	2N4928	2N4928	A	0.25W	A	175	100	100	U						12	E	1.0M	B
2N1477	S	P	2N4928	2N4928	A	0.25W	A	175	100	100	U						30	E	1.0M	B
2N1478	G	P	2N3427	2N3427	S	250M	A	100	30	20	S	40		100M	0.2	10M			3.0M	B
2N1479	S	N	2N4237	2N4237	SP	5.0W	C	200	60	60	V	20	60	200M	1.4	200M				
2N1480	S	N	2N4238	2N4237	SP	5.0W	C	200	100	100	V	20	60	200M	1.4	200M				
2N1481	S	N	2N4237	2N4237	SP	5.0W	C	200	60	60	V	35	100	200M	1.4	200M				
2N1482	S	N	2N4238	2N4237	SP	5.0W	C	200	100	100	V	35	100	200M	1.4	200M				
2N1483	S	N	2N4231	2N4231	SP	25W	C	200	60	60	V	20	60	750M	2.0	750M				
2N1484	S	N	2N4232	2N4231	SP	25W	C	200	100	100	V	20	60	750M	2.0	750M				
2N1485	S	N	2N4231	2N4231	SP	25W	C	200	60	60	V	35	100	750M	0.75	750M				
2N1486	S	N	2N4232	2N4231	SP	25W	C	200	100	100	V	35	100	750M	0.75	750M				
2N1487	S	N	2N4913	2N4913	SP	75W	C	200	60	60	V	15	45	200M	3.0	1.5A				
2N1488	S	N	2N4914	2N4913	SP	75W	C	200	100	100	V	15	45	200M	3.0	1.5A				
2N1489	S	N	2N4913	2N4913	SP	75W	C	200	60	60	V	25	75	1.5A	1.0	1.5A				
2N1490	S	N	2N4914	2N4913	SP	75W	C	200	100	100	V	25	75	1.5A	1.0	1.5A				
2N1491	S	N	2N2218	2N2218	AH	3.0W	C	175	30								15	E		
2N1492	S	N	2N2192	2N2192	AH	3.0W	C	175	60								15	E		
2N1493	S	N	2N3500	2N3498	AH	3.0W	C	175	100			4.0					15	E		
2N1494	G	P		2N1204	SH	400M	A	100	20	15	O	15		400M	0.5	200M			220M	T
2N1494A	G	P		2N1204	SH	400M	A	100	20	15	O	25		200M	0.4	200M			220M	T
2N1495	G	P		2N1204	SH	300M	A	100	40	25	O	25		200M	0.3	200M			150M	T
2N1495A	G	P			SH	0.25W	A	100	40	25	O	25		0.2A	0.3	0.2A			150M	T
2N1496	G	P		2N1204	SH	500M	A	100	40	25	O	25		200M	0.3	200M			150M	T
2N1499	G	P			SH	25M	A	85	20	15	S	20		10M	0.2	10M				
2N1499A	G	P			SH	60M	A	100	20	20	S	30		10M	0.2	10M				
2N1499B	G	P			SH	75M	A	100	30	20	O	40		10M	0.2	10M			100M	T
2N1500	C	P			SH	60M	A	100	15	12	S	20		10M	0.2	10M			150M	T
2N1501	C	P	2N2144	2N2137	SP	34W	J	95	60	40		25	100	2.0A	0.6	2.0A			120M	T
2N1502	C	P	2N2143	2N2137	SP	34W	J	95	40	40		25	100	2.0A	0.6	2.0A			200K	T
2N1504	G	P			AP	25W	C	95	80	60	O	21		0.5A	0.75	1.0A			200K	E
2N1505	S	N	2N2219A	2N2218	AHP	0.8W	A	175	50	20	O	7.0	100	0.1A	2.0	0.15A			70M	T
2N1506	S	N	2N2219A	2N2218	AHP	0.8W	A	175	60	20	O	10	100	0.1A	1.5	0.15A			140M	T
2N1506A	S	N	2N3444	2N3252	AHP	0.8W	A	200	80	50	O	10	100	0.1A	0.6	0.15A			140M	T
2N1507	S	N	2N2219	2N2218	S	600M	A	175	60	30	R	100	300	150M	1.5	150M			50M	T
2N1508	S	N	2N3019	2N3019	S	1.0W	A	175	100	55	O	20	60	600M	3.6	600M			50M	T
2N1509	S	N	2N3019	2N3019	S	1.0W	A	175	60	35	O	20	60	600M	3.6	600M			50M	T
2N1510	G	N			AL	75M	A	85	75	70	R	8.0	90	1.0M	0.8	4.0M				
2N1511	S	N	2N4913	2N4913	SP	75W	C	200	60	60	V	4.0		6.0A	7.2	6.0A			0.3M	T
2N1512	S	N	2N4914	2N4913	SP	75W	C	200	100	100	V	7.0		6.0A	6.0	6.0A			0.3M	T
2N1513	S	N	2N4913	2N4913	SP	75W	C	200	60	60	V	7.0		6.0A	6.0	6.0A			0.3M	T
2N1514	S	N	2N4914	2N4913	SP	75W	C	200	100	100	V									
2N1516	G	P			AH	83M	A	75	25			20		1.0M					0.3M	T
2N1518	G	P	MP943		SP	50W	C	95	50	40		15	60	15A	0.7	25A				
2N1519	G	P	MP943A		SP	50W	C	95	80	60		15	60	15A	0.7	25A				
2N1520	G	P			SP	50W	C	95	50	40		17	68	15A	0.6	35A				
2N1521	G	P			SP	50W	C	95	80	60		17	68	15A	0.6	35A				
2N1522	G	P			SP	50W	C	95	50	40		25	100	15A	0.5	50A				
2N1523	G	P			SP	50W	C	95	80	60	B	25	100	15A	0.5	50A				
2N1524	C	P	2N3325	2N3323	AH	80M	A	85	24								17	E		
2N1525	C	P	2N3325	2N3323	AH	80M	A	85	24								17	E		
2N1526	C	P	2N3325	2N3323	AH	80M	A	85	24								27	E		
2N1527	G	P	2N3325	2N3323	AH	80M	A	85	24								27	E		
2N1528	S	N	2N2218	2N2218	AH	150M	A	175	25	30	S						10	E		
2N1529	G	P		2N1529	AP	90W	C	100	40	30	S	20	40	3.0A	1.5	3.0A				
2N1529A	G	P		2N1529	AP	90W	C	100	40	20	O	20	40	3.0A	1.5	3.0A			5.0K	E
2N1530	G	P		2N1529	AP	90W	C	100	60	45	S	20	40	3.0A	1.5	3.0A				
2N1530A	G	P		2N1529	AP	90W	C	100	60	30	O	20	40	3.0A	1.5	3.0A				
2N1531	C	P		2N1529	AP	90W	C	100	80	60	S	20	40	3.0A	1.5	3.0A				
2N1531A	C	P		2N1529	AP	90W	C	100	80	40	O	20	40	3.0A	1.5	3.0A			5.0K	E
2N1532	G	P		2N1529	AP	90W	C	100	100	75	S	20	40	3.0A	1.5	3.0A				
2N1532A	G	P		2N1529	AP	90W	C	100	100	50	O	20	40	3.0A	1.5	3.0A			5.0K	E
2N1533	G	P		2N1529	AP	90W	C	100	120	90	S	20	40	3.0A	1.5	3.0A				
2N1534	C	P		2N1529	AP	90W	C	100	40	30	S	35	70	3.0A	1.2	3.0A				
2N1534A	G	P		2N1529	AP	90W	C	100	40	20	O	35	70	3.0A	1.2	3.0A			5.0K	E
2N1535	G	P		2N1529	AP	90W	C	100	60	45	S	35	70	3.0A	1.2	3.0A				
2N1535A	G	P		2N1529	AP	90W	C	100	60	30	O	35	70	3.0A	1.2	3.0A			5.0K	E
2N1536	G	P		2N1529	AP	90W	C	100	80	60	S	35	70	3.0A	1.2	3.0A				
2N1536A	G	P		2N1529	AP	90W	C	100	80	40	O	35	70	3.0A	1.2	3.0A			5.0K	E
2N1537	G	P		2N1529	AP	90W														



## 2

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## 2N1642-2N1731

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub>	Subscript					
						@ 25°C	°C	(volts)	(volts)	(min)							(max)	Units	(volts)	@ I <sub>C</sub>	Units
2N1642	S	P	2N2218	2N2218	SC	250M	A	160	30	6.0	U	15	100*								
2N1643	S	P			A	250M	A	160	25	25	U	10	25	100*							
2N1644	S	N			S	2.0W	C	175	60	40	R	40	120	150M	1.5	150M					
2N1645	G	N			AHP	1.0W	A	100	35	20	O	20		0.2A	4.0	0.2A					
2N1646	G	N			SH	150M	A	100	15	12	S	20		10M							
2N1647	S	N	2N5477	2N5477	AHP	40W	C	175	80	80	V	15	45	0.5A	3.0	1.0A					
2N1648	S	N	2N5479	2N5477	AHP	40W	C	175	120	80	O	15	45	0.5A	3.0	1.0A					
2N1649	S	N	2N5477	2N5477	AHP	40W	C	175	80	80	V	30	90	0.5A	3.0	1.0A					
2N1650	S	N	2N5477	2N5477	AHP	40W	C	175	120	80	O	30		0.5A	3.0	1.0A					
2N1651	G	P			2N1651	AP	100W	C	110	60	S	35	140	10A	0.65	25A					
2N1652	G	P			2N1651	AP	100W	C	110	100	S	35	140	10A	0.65	25A					
2N1653	G	P			2N1651	AP	100W	C	110	120	S	35	140	10A	0.65	25A					
2N1654	S	N	MM3006	MM3005	AP	250M	A	160	100	80	O	20	45	1.0M	0.3	5.0M					
2N1655	S	N	MM3007	MM3005	AP	250M	A	160	125	100	O	10	22	1.0M	0.3	5.0M					
2N1656	S	N	MM3007	MM3005	AP	250M	A	160	125	100	O	20	45	1.0M	0.3	5.0M					
2N1657	S	N	MM3005	MM3005	AP		C	200	60	60	S	7.5	30	0.85A	4.5	0.85A					
2N1660	S	N			AP	85W	C	200	60	60	R	45	135	1.0A	4.0	1.0A					
2N1661	S	N			AP	85W	C	200	80	80	R	45	135	1.0A	4.0	1.0A					
2N1662	S	N			AP	85W	C	200	100	100	R	45	135	1.0A	4.0	1.0A					
2N1663	S	N			SH	150M	A	150	20	15	O	30	150	20M	0.25	10M					
2N1664	G	P			A	0.2W	A	100	45	40	R	45	120	10M	0.5	0.1A					
2N1665	G	P			AH	150M	A	85	15	12	O	5.0	100	10M							
2N1666	G	P	2N3616	2N3615	SP	30W	C	90	80	60	V	15	30	6.0A	0.5	6.0A					
2N1667	G	P	2N3618	2N3615	SP	30W	C	90	60	48	X	35	80	6.0A	0.5	6.0A					
2N1668	G	P	2N3616	2N3615	SP	30W	C	90	80	60	X	20	65	6.0A	0.5	6.0A					
2N1670	G	P			S	0.12W	A	85	100			15		10M							
2N1671	Unijunction Transistor, see Table on Page 2-88																				
2N1672	G	N			AL	120M	A	85	40	40	X	20		1.0M							
2N1672A	G	N			AL	120M	A	85	40	40	X	20		1.0M							
2N1673	C	P			AH	80M	A	85	35												
2N1674	S	N			A	0.2W	A	200	45	45	O			1.5	5.0M						
2N1675	S	N			SHP	50W	C	150	100	100	S	25	100	1.0A	2.5	5.0A					
2N1676	S	P			SC	100M	A	140	4.5	4.5	U			0.1	5.0M						
2N1677	S	P			SC	100M	A	140	4.5	4.5	U			0.1	5.0M						
2N1678	G	P			S	120M	A	85	60	60	S	25		20M							
2N1679	S	N	2N5335	2N5334	S	1.0W	A	175	100	55	O	40	120	600M	3.6	600M					
2N1680	S	N	2N5334	2N5334	S	1.0W	A	175	60	35	O	40	120	600M	3.6	600M					
2N1681	G	P			S	0.18W	C	100	30	15	O	30	120	10M	0.1	10M					
2N1682	S	N			S	500M	A	175	25	20	R	20		10M	0.6	10M					
2N1683	G	P			SH	150M	A	85	13	12	O	50		40M	12	1.0A					
2N1684	G	P			S	100M	A	100	25	25	X				0.15	12M					
2N1685	G	P			S	100M	A	100	25	20	R	60	180	30M		100M					
2N1686	Thyristors, see Table on Page 2-70																				
2N1689																					
2N1690	S	N	2N4912	2N4910	AP	40W	C	200	80	80	O	20	60	500M	7.5	500M					
2N1691	S	N	2N5050	2N5050	AP	40W	C	200	120	120	O	20	60	500M	7.5	500M					
2N1692	G	P			2N1561	AH	350M	A	100	25	15	O			3.0	200M					
2N1693	G	P			2N1561	AH	350M	A	100	25	15	O			4.0	200M					
2N1694	G	N			S	75M	A	85	20	20	O	17	50	1.0M							
2N1699	G	P			SH	100M	A	100	40	40	X	20	175	1.5M							
2N1700	S	N	2N4237	2N4237	S	5.0W	C	200	60	60	V	20	80	100M	12.5	2.5A					
2N1701	S	N	2N4910	2N4910	S	25W	C	200	60	60	V	20	80	300M	20	5.0A					
2N1702	S	N	2N5067	2N5067	S	75W	C	200	60	60	V	15	60	800M	20	5.0A					
2N1703	S	N	2N5067	2N5067	S	75W	C	200	60	60	V	15	60	800M							
2N1704	S	N	2N2218	2N2218	S	3.3M	J	175	45	45	O	50	200	1.0M	1.0	10M					
2N1705	G	P			2N1705	A	0.2W	A	100	18	R										
2N1706	G	P			2N1705	A	0.2W	A	100	25	R	60	120	20M							
2N1707	G	P			2N1705	A	0.2W	A	100	30	R	30	150	10M							
2N1708	S	N			2N1708	SH	1.0W	C	175	25	12	O	20	10M	0.22	10M					
2N1708A	S	N			SH	300M	A	175	40	20	R	30	120	10M	0.22	10M					
2N1709	S	N			AHP	15W	C	175	75	30	O	7.5	75	0.35A	5.0	1.0A					
2N1710	S	N			AHP	15W	C	175	60	30	O	4.0	100	0.35A	5.0	1.0A					
2N1711	S	N			AH	800M	A	200	75	50	R	100	300	150M	1.5	150M					
2N1711A	S	N	2N2219A	2N2218A	SH	1.0W	A	200	75	50	R	100	300	150M	1.0	150M					
2N1711B	S	N	2N2219A	2N2218A	AH	1.0W	A	200	120	55	R	100	300	150M	0.2	150M					
2N1713	G	P			2N4237	AP	20W	C	175	90	60	O	20	60	200M	2.0	200M				
2N1714	S	N	2N4237	2N4237	AP	20W	C	175	150	100	O	20	60	200M	2.0	200M					
2N1715	S	N	2N5681	2N5681	AP	20W	C	175	90	60	O	40	120	200M	2.0	200M					
2N1716	S	N	2N4237	2N4237	AP	20W	C	175	150	100	O	40	120	200M	2.0	200M					
2N1717	S	N			AP	20W	C	175	150	100	O	40	120	200M	2.0	200M					
2N1718	S	N	2N3766	2N3766	AP	20W	C	175	90	60	O	20	60	200M	2.0	200M					
2N1719	S	N	2N3767	2N3766	AP	20W	C	175	150	100	O	20	60	200M	2.0	200M					
2N1720	S	N	2N3766	2N3766	AP	20W	C	175	90	60	O	40	120	200M	2.0	200M					
2N1721	S	N	2N3767	2N3766	AP	20W	C	175	150	100	O	40	120	200M	2.0	200M					
2N1722	S	N	2N5427	2N5427	AP	50W	C	175	120	80	O	20	90	2.0A	1.0	2.0A					
2N1722A	S	N			AP	50W	C	175	180	120	O	30	90	2.0A	0.6	2.0A					
2N1723	S	N	2N5428	2N5427	AP	50W	C	175	120	80	O	50	150	2.0A	1.0	2.0A					
2N1724	S	N			AP	50W	C	175	120	80	O	20	90	2.0A	1.0	2.0A					
2N1724A	S	N	2N1724A	2N1724	AP	50W	C	175	180	120	O	30	90	2.0A	0.6	2.0A					
2N1725	S	N			AP	50W	C	175	120	80	O	50	150	2.0A	1.0	2.0A					
2N1726	G	P	2N3323	2N3323	AH	60M	A	100	20	20	S	50		1.0M							
2N1727	G	P	2N3324	2N3323	AH	60M	A	100	20	20	S	20		1.0M							
2N1728	G	P	2N3324	2N3323	AH	60M	A	100	20	20	S	20		1.0M							



2N1732-2N1868

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE—</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>		Subscript		
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)			Units	Units		Units	Units
2N1732	G	N		2N499	A	150M	85	30	30	X	40		10M						5.0M	B	
2N1742	G	P		2N3284	AH	60M	125	20	20	S	10		2.0M								
2N1743	G	P	2N3284	2N3283	AH	60M	125	20	20	S	10		2.0M								
2N1744	G	P	2N3284	2N3283	AH	60M	125	20	20	S	10		2.0M								
2N1745	G	P	2N3285	2N3283	AH	60M	100	20	20	S	10		2.0M								
2N1746	G	P	2N3323	2N3323	AH	60M	100	20	20	S	10		1.0M					100M	M		
2N1747	G	P	2N3324	2N3323	AH	60M	100	20	20	S	10		1.0M								
2N1748	G	P	2N3324	2N3323	AH	60M	100	25	25	S							30	E	80M	T	
2N1748A	G	P	2N3323	2N3323	AH	60M	100	25	25	S							30	E	100M	T	
2N1749	G	P	2N3323	2N3323	AH	75M	100	40	40	S								80M	30M	T	
2N1750	G	P		A	15M	A	75	14	6.0	S	18	40	500*	0.5	20A	20	E	30M	1.5M	B	
2N1751	G	P		2N2832	AP	A	110	80	80	S	30	90	20A								
2N1752	G	P	2N3325	2N3323	A	60M	100	12	12	S							50	E	50M	M	
2N1753	G	P		AH	30M	A	85	30	18	O	50	220	100*	0.2	10M						
2N1754	G	P		SH	50M	A	85	13	13	S	20		10M	0.7	3.0A						
2N1755	G	P	2N2137	2N2137	SP	28W	C	95	40	35	30	75	0.5A	0.7	3.0A				15K	E	
2N1756	G	P	2N2138	2N2137	SP	28W	C	95	60	50	30	75	0.5A	0.7	3.0A						
2N1757	G	P	2N2139	2N2137	SP	28W	C	95	80	65	30	75	0.5A	0.7	3.0A				15K	E	
2N1758	G	P	2N2140	2N2137	SP	28W	C	95	100	75	30	75	0.5A	0.7	3.0A				15K	E	
2N1759	G	P	2N2142	2N2137	SP	28W	C	95	40	35	60	150	0.5A	0.5	3.0A				15K	E	
2N1760	G	P	2N2143	2N2137	SP	28W	C	95	60	50	60	150	0.5A	0.5	3.0A				15K	E	
2N1761	G	P	2N2144	2N2137	SP	28W	C	95	80	65	60	150	0.5A	0.5	3.0A				15K	E	
2N1762	G	P	2N2145	2N2137	SP	28W	C	95	100	75	60	150	0.5A	0.5	3.0A				15K	E	
2N1763	S	N		S	0.3W	A	175	40	25	O			1.5	10M							
2N1764	S	N	2N2369A	2N2369A	S	0.3W	A	175	20	15	O		1.5	10M							
2N1765	Thyristors, see Table on Page 2-70																				
2N1768	S	N	2N4231	2N4231	S	40W	C	200	60	40	O	35	100	750M	0.75	750M			600K	B	
2N1769	S	N	2N4233	2N4231	S	40W	C	200	100	55	O	35	100	750M	0.75	750M			600K	B	
2N1770	Thyristors, see Table on Page 2-70																				
2N1778	G	P		S	100M	A	100	25	20	R	20	60	30M								
2N1779	G	P	2N3798	2N3798	S	100M	A	100	25	25	R	30	110	30M	0.15	12M			4.0M	B	
2N1780	G	P		S	100M	A	100	25	25	X	40		20M	0.20	50M			4.0M	B		
2N1781	G	P		S	100M	A	100	30	20	X	30	150	10M	0.32	200M	30	E	5.0M	B		
2N1783	G	P		S	100M	A	100	30	15	O	20		10M					5.0M	B		
2N1784	G	P		S	100M	A	100	30	20	O	20		10M	0.32	200M			10M	B		
2N1785	G	P	2N3324	2N3323	AH	45M	A	85	10	10	S	40	1.0M					50M	M		
2N1786	G	P	2N3323	2N3323	AH	45M	A	85	10	15	S	15	1.0M					50M	M		
2N1787	G	P	2N3324	2N3323	AH	45M	A	85	15	15	S	25	1.0M					50M	M		
2N1788	G	P	2N3324	2N3323	AH	50M	A	100	35	35	S	50	1.0M					100M	M		
2N1789	G	P	2N3325	2N3323	AH	60M	A	100	35	35	S	20	1.0M					100M	M		
2N1790	G	P	2N3323	2N3323	AH	60M	A	100	35	35	S	40	1.0M					100M	M		
2N1792	Thyristors, see Table on Page 2-70																				
2N1807	G	N		S	150M	A	85	25	50	V	10		10A	0.15	12M						
2N1808	G	N	2N5885	2N5883	SP	250W	C	175	50	50	V	10	10A	1.5	10A			4.0M	B		
2N1809	S	N	2N5629	2N5629	SP	250W	C	175	100	100	V	10	10A	1.5	10A						
2N1810	S	N	2N5629	2N5629	SP	250W	C	175	150	150	V	10	10A	1.5	10A						
2N1811	S	N		SP	250W	C	175	200	200	V	10	10A	1.5	10A							
2N1812	S	N		SP	250W	C	175	250	250	V	10	10A	1.5	10A							
2N1813	S	N		SP	250W	C	175	300	300	V	10	10A	1.5	10A							
2N1814	S	N		SP	250W	C	175	300	300	V	10	10A	1.5	10A							
2N1816	S	N	2N5302	2N5301	SP	250W	C	175	50	50	V	10	15A	1.5	15A						
2N1817	S	N	2N5303	2N5301	SP	250W	C	175	100	100	V	10	15A	1.5	15A						
2N1818	S	N		SP	250W	C	175	150	150	V	10	15A	1.5	15A							
2N1819	S	N		SP	250W	C	175	200	200	V	10	15A	1.5	15A							
2N1820	S	N		SP	250W	C	175	250	250	V	10	15A	1.5	15A							
2N1821	S	N		SP	250W	C	175	300	300	V	10	15A	1.5	15A							
2N1823	S	N	2N5685	2N5685	SP	250W	C	175	50	50	V	10	20A	1.5	20A						
2N1824	S	N	2N5686	2N5685	SP	250W	C	175	100	100	V	10	20A	1.5	20A						
2N1825	S	N		SP	250W	C	175	150	150	V	10	20A	1.5	20A							
2N1826	S	N		SP	250W	C	175	200	200	V	10	20A	1.5	20A							
2N1827	S	N		SP	250W	C	175	250	250	V	10	20A	1.5	20A							
2N1828	S	N		SP	250W	C	175	300	300	V	10	20A	1.5	20A							
2N1830	S	N	2N5685	2N5685	SP	250W	C	175	50	50	V	10	25A	1.5	25A						
2N1831	S	N	2N5686	2N5685	SP	250W	C	175	100	100	V	10	25A	1.5	25A						
2N1832	S	N		SP	250W	C	175	150	150	V	10	25A	1.5	25A							
2N1833	S	N		SP	250W	C	175	200	200	V	10	25A	1.5	25A							
2N1834	S	N		SP	250W	C	175	250	250	V	10	25A	1.5	25A							
2N1835	S	N		SP	250W	C	175	300	300	V	10	25A	1.5	25A							
2N1837	S	N	2N2218	2N2218	SH	800M	A	300	80	30	O	40	120	150M	0.8	150M			140M	T	
2N1837A	S	N	2N2218	2N2218	SH	0.8W	A	175	80	30	O	40	120	0.15A	0.8	0.15A			140M	T	
2N1837B	S	N	2N2218	2N2218	SH	0.8W	A	200	80	30	O	40	120	0.15A	0.8	0.15A			140M	T	
2N1838	S	N	2N2218	2N2218	SH	0.6W	A	175	45	20	O	40	150	0.1A	1.4	0.1A			90M	T	
2N1839	S	N	2N2218	2N2218	SH	0.6W	A	175	45	20	O	12	50	0.1A	1.4	0.15A			90M	T	
2N1840	S	N	2N2218	2N2218	SH	0.6W	A	175	25	15	O	10	100	0.15A	1.4	0.15A			90M	T	
2N1841	S	N	2N5334	2N5334	AHP	2.0W	A	150	100	50	O	15	50	1.0	1.0A			90M	60M	E	
2N1842	Thyristors, see Table on Page 2-70																				
2N1850	G	P		SH	150M	A	85	18	6.0	O	30		6.0M	0.2	6.0M						
2N1853	G	P		SH	150M	A	85	18	6.0	O	40		20M	0.2	20M						
2N1854	G	P	2N3324	2N3323	AH	60M	A	100	20	20	S	10	1.0M					20	E	40M	T
2N1864	G	P	2N3325	2N3323	AH	60M	A	100	20	20	S	40	1.0M						50M	M	
2N1865	G	P	2N3323	2N3323	AH	60M	A	100	35	35	S	40	1.0M								
2N1866	G	P	2N3324	2N3323	AH	60M	A	100	35	35	S	10	1.0M								
2N1867	G	P	2N3325	2N3323	AH	60M	A	100	20	20											



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript				
												Units	(volts)						Units	Units	Units	Units
2N1869 thru 2N1885	Thyristors, see Table on Page 2-70																					
2N1886	S	N	2N4911	2N4910	AHP	20W	C	175	60	60	0	20	80	0.5A	5.0	1.0A			2.0M	T	T	
2N1889	S	N	2N3498	2N3498	AH	800M	A	200	100	80	R	40	120	150M	5.0	150M	30	E	50M	T	T	
2N1890	S	N	2N3499	2N3498	AH	800M	A	200	100	85	0	25		100M	0.15	100M	50	E	50M	T	T	
2N1891	G	P			SH	150M	A	85	30	15	0	40	200	10M	0.2	10M	30	E	5.0M	B	B	
2N1892	G	P			S	150M	A	85	30	15	0	40	200	10M	0.2	10M	30	E	5.0M	B	B	
2N1893	S	N		2N1893	AH	800M	A	200	120	100	R	40	120	150M	5.0	150M	30	E	50M	T	T	
2N1893A	S	N	2N3498	2N3498	AHP	0.8W	A	200	140	80	0	40	120	0.15A	2.0	0.15A	30	E	100M	T	T	
2N1894	S	N	2N4238	2N4237	AP			200	60	60	R	12	60	1.0A	5.0	1.0A						
2N1895	S	N	2N4239	2N4237	AP			200	80	80	R	12	60	1.0A	10	1.0A						
2N1896	S	N	2N5336	2N5336	AP			200	60	60	R	45	135	1.0A	4.0	1.0A			25M	T	T	
2N1897	S	N	2N5336	2N5336	AP			200	80	80	R	45	135	1.0A	4.0	1.0A			25M	T	T	
2N1898	S	N	2N5336	2N5336	AP			200	100	100	R	45	135	1.0A	4.0	1.0A			25M	T	T	
2N1899	S	N	2N5338	2N5336	AHP	125W	C	150	140	50	0	10	30	10A	1.0	10A			50M	T	T	
2N1900	S	N			AHP	125W	C	150	140	50	0	8.0	60	10A	2.0	10A			50M	T	T	
2N1901	S	N			SH	125W	C	150	140	50	0	20	60	10A	1.0	10A			50M	T	T	
2N1902	S	N			SH	125W	C	150	140	50	0	10	30	10A	1.0	10A			50M	T	T	
2N1903	S	N			AHP	125W	C	150	140	50	0	8.0	60	10A	2.0	10A			50M	T	T	
2N1904	S	N			SH	125W	C	150	140	50	0	20	60	10A	1.0	10A			50M	T	T	
2N1905	G	P	2N2832	2N2832	AP	30W	C	100	100	50	0	50	150	1.0A	1.0	5.0A	30	E				
2N1906	G	P	2N2832	2N2832	AP	30W	C	100	130	60	0	75	250	1.0A	5.0	5.0A	50	E				
2N1907	G	P	MP1907		AHP	60W	C	100	100	40	0				1.0	15A			10M	T	T	
2N1907A	G	P			AHP	60W	C	100	100	40	0	30	170	10A	0.7	10A	2.0	E				
2N1908	G	P	MP1910		AHP	60W	C	100	130	50	0	30	170	10A	1.0	15A	2.0	E	10M	T	T	
2N1908A	G	P			AHP	60W	C	100	130	50	0	30	170	10A	0.7	10A						
2N1909	Thyristors, see Table on Page 2-70																					
2N1916	S	P			SC	0.25W	A	175	25	8.0	0						25	E	16M	T	T	
2N1917	S	P			SC	0.25W	A	175	25	8.0	0						25	E	10M	T	T	
2N1918	S	P			SC	0.25W	A	175	40	18	0			0.003					1.0M	B	B	
2N1919	S	P			SC	0.25W	A	175	40	18	0			0.004					1.0M	B	B	
2N1920	S	P			SC	0.25W	A	175	50	50	0			0.005					1.0M	B	B	
2N1921	S	P			SC	0.25W	A	175	80	80	0			0.005					1.0M	B	B	
2N1922	S	P			SC	0.25W	A	175	80	80	0			0.005					1.0M	B	B	
2N1923	S	N	2N3498	2N3498	A	750M	A	150	85	85	0	4.0	90		7.0	20M	28	E				
2N1924	G	P		2N1924	A	225M	A	100	60	40	R	34	65	20M	0.11	20M	30	E	1.0M	B	B	
2N1925	G	P		2N1924	A	225M	A	100	60	40	R	53	90	20M	0.11	20M	44	E	1.3M	B	B	
2N1926	G	P		2N1924	A	225M	A	100	60	40	R	72	121	20M	0.11	20M	60	E	1.5M	B	B	
2N1929	Thyristors, see Table on Page 2-70																					
2N1935	S	N	MJ7000	MJ7000	AP	150W	C	175	125	80	0	7.0	50	10A	0.75	10A	15	E	4.0M	T	T	
2N1936	S	N	MJ7000	MJ7000	AP	150W	C	175	125	80	0	7.0	50	10A	0.75	10A	15	E	4.0M	T	T	
2N1937	S	N	MJ7000	MJ7000	AHP	3.5W	C	100	30	15	0	5.0		40M	1.8	200M						
2N1940	G	P			A	0.6W	A	175	45	30	R	30	150	10M	1.5	5.0M	40	E	60M	T	T	
2N1941	G	P	2N2219A	2N2218	S	0.2W	A	85	20	10	0	20	60	0.2A					5.0M	B	B	
2N1942	G	P			A	800M	A	200	60	60	0	30	90	200M	5.0	200M	12	E				
2N1943	S	N	2N3020	2N3019	A	800M	A	200	60	60	0	30	90	200M	5.0	200M						
2N1944	S	N	2N2219A	2N2218	S	0.6W	A	175	20	20	R	150	450	1.0M			100	E	60M	T	T	
2N1945	S	N	2N2219A	2N2218	S	0.6W	A	175	30	30	R	150	450	1.0M			100	E	60M	T	T	
2N1946	S	N	2N2219A	2N2218	S	0.6W	A	175	40	40	R	150	450	1.0M			100	E	60M	T	T	
2N1947	S	N			S	0.6W	A	175	20	20	R	500	800	0.1A			100	E	60M	T	T	
2N1948	S	N			S	0.6W	A	175	30	30	R	500	800	0.1A			100	E	60M	T	T	
2N1949	S	N			S	0.6W	A	175	40	40	R	500	800	0.1A			100	E	60M	T	T	
2N1950	S	N			S	0.6W	A	175	20	20	R	250	500	0.1A			75	E	60M	T	T	
2N1951	S	N			S	0.6W	A	175	30	30	R	250	500	0.1A			75	E	60M	T	T	
2N1952	S	N			S	0.6W	A	175	40	40	R	250	500	0.1A			75	E	60M	T	T	
2N1953	S	N	2N2218	2N2218	A	0.6W	A	175	20	20	S	15	150	10M			28	E	40M	T	T	
2N1954	G	P	2N651	2N650	S	200M	A	100	60	20	0	30	120	20M	0.3	20M						
2N1955	G	P	2N1190	2N1189	S	200M	A	100	60	18	0	50	200	20M	0.175	20M						
2N1956	G	P	2N651	2N650	S	200M	A	100	60	16	0	30	120	20M	0.175	20M						
2N1957	G	P	2N1187	2N1175	S	200M	A	100	60	14	0	30	120	20M	0.175	20M						
2N1958	S	N	2N2537	2N2537	SH	600M	A	175	60	40	R	20	60	150M	0.45	150M			100M	T	T	
2N1958A	S	N	2N2537	2N2537	SH	600M	A	175	60	40	R	20	60	150M	0.45	150M			100M	T	T	
2N1959	S	N	2N2537	2N1959	SH	600M	A	175	60	40	R	40	120	150M	0.45	150M	1.0	E				
2N1959A	S	N	2N2537	2N2537	SH	600M	A	175	60	40	R	40	120	150M	0.45	150M			100M	T	T	
2N1960	G	P			SH	150M	A	100	15	15	S	25		10M	0.16	10M						
2N1961	G	P			SH	150M	A	100	12	12	S	20		10M	0.20	10M						
2N1962	S	N	2N2537	2N2537	SH	400M	A	175	40	20	R	20	60	10M	0.25	10M			200M	T	T	
2N1963	S	N	2N2537	2N2537	SH	400M	A	175	30	15	R	25		10M	0.16	10M			200M	T	T	
2N1964	S	N	2N2539	2N2537	SH	400M	A	175	60	40	R	20	60	150M	0.45	150M			100M	T	T	
2N1965	S	N	2N2539	2N2537	SH	0.4W	A	175	60	40	R	40	120	0.15A	0.45	0.15A			100M	T	T	
2N1966	G	P			AL	0.12W	A	75	35	15	R								10M	B	B	
2N1967	G	P			AL	0.12W	A	75	35	15	R								5.0K	E	E	
2N1968	G	P			AL	0.12W	A	75	35	18	R								15K	E	E	
2N1969	G	P																				



# 2N1984-2N2079

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub> Units	Subscript		
											(min)	(max)	Units	(volts)					Units	
2N1984	S	N	2N2218 2N2219 2N2218 2N2218A 2N2218A 2N1990 2N1991 2N1992 2N1993 2N1994 2N1995	2N1983	A	600M	A	150	50	25	0				35	E	40M	T		
2N1985	S	N		2N2218	A	600M	A	150	50	25	0				15	E	40M	T		
2N1986	S	N		2N2219	AH	600M	A	150	50	25	0	60	240	150M	1.5	150M	40M	T		
2N1987	S	N		2N2218	AH	600M	A	150	50	25	0	20	80	150M	1.5	150M	40M	T		
2N1988	S	N		2N2218A	AH	600M	A	150	100	45	0	35	120	30M	2.0	30M	40M	T		
2N1989	S	N		2N2218A	AH	600M	A	150	100	45	0	20	60	30M	2.0	30M	40M	T		
2N1990	S	N		2N1990	SP	600M	A	150	100		0	20	60	30M	0.5	2.0M				
2N1991	S	P		2N1131	AH	600M	A	150	30	20	0	15	60	150M	1.5	150M	40M	T		
2N1992	S	N		2N2221	2N2218	SH	0.35W	A	200	15	15	0	30	120	1.0M	0.25	10M	300M	T	
2N1993	G	N				S	150M	A	100	30	18	0	50	300	10M	0.2	10M	3.0M	B	
2N1994	G	N			S	150M	A	85	30	15	0	15	10M	0.25	200M	3.0M	B			
2N1995	G	N			S	150M	A	85	25	15	0	25	10M	0.25	200M	5.0M	B			
2N1996	G	N	2N5230 2N5231 2N5231		S	150M	A	85	20	15	0	35	200	10M	0.25	200M		8.0M		
2N1997	G	P			S	250M	A	100	45	15	0	40	200	100M	0.2	10M	3.0M	B		
2N1998	G	P			S	250M	A	100	35	15	0	70	225	100M	0.2	10M	5.6M	T		
2N1999	G	P			S	250M	A	100	30	15	0	100	350	100M	0.2	10M	10M	T		
2N2000	G	P			S	300M	A	100	50	15	0	50	300	100M	0.35	500M	2.0M	B		
2N2001	G	P			S	300M	A	100	30	15	0	100	100M	0.2	10M	6.0M	B			
2N2002	S	P		2N5230	2N5229	SC	0.25W	A	200	30	5.0	0								
2N2003	S	P		2N5230	2N5229	SC	0.25W	A	200	30	5.0	0								
2N2004	S	P		2N5231	2N5229	SC	0.25W	A	175	50	15	0	12	1.0M			15	E	0.5M	B
2N2005	S	P		2N5231	2N5229	SC	0.25W	A	200	50	15	0								
2N2006	S	P			SC	0.25W	A	200	60	35	0									
2N2007	S	P			SC	0.25W	A	200	60	35	0									
2N2008	S	N	2N3500	2N3498	A	800M	A	200	175	110	0	30	90	10M	2.5	25M	20	E	40M	T
2N2009	Thyristors, see Table on Page 2-70																			
2N2010																				
2N2011	S	N	2N5881	2N5879	A	150W	C	200	100	50	0	15	50	5.0A	1.25	5.0A	12	E	12K	E
2N2012	S	N	2N5882	2N5879	A	150W	C	200	130	65	0	15	50	5.0A	1.25	5.0A	12	E	12K	E
2N2013	S	N	2N2405	2N1893	A	1.0W	A	200	60	60	0	50	200	200M			30	E		
2N2014	S	N	2N5051	2N5050	AHP	20W	C	175	150	150	V	20	60	0.5A	6.0	1.0A			2.0M	T
2N2015	S	N	2N5052	2N5050	AHP	20W	C	175	200	200	V	20	60	0.5A	6.0	1.0A			2.0M	T
2N2016	S	N	2N5050	2N5050	AHP	20W	C	175	150	125	0	40	90	0.5A	6.0	1.0A			3.0M	T
2N2017	S	N	2N5051	2N5050	AHP	20W	C	175	200	140	0	40	90	0.5A	6.0	1.0A			3.0M	T
2N2018	G	P		SH	0.15W	A	100	15	12	S	25	150	10M	1.2	50M			250M	T	
2N2019	Thyristors, see Table on Page 2-70																			
2N2020																				
2N2021	S	N	2N4232	2N4231	AHP	4.5W	C	200	45	45	0	20		2.0A	5.0	2.0A			3.0M	T
2N2022	S	N	2N3020	2N3019	SP	5.0W	C	200	80	60	0	20	60	500M	0.4	500M	1.0M	T		
2N2023	S	N	2N4238	2N4237	SP	14W	C	200	80	60	0	20	60	1.0A	0.3	1.0A	1.0M	T		
2N2024	S	N	2N4232	2N4231	SP	17W	C	200	80	60	0	20	60	1.5A	0.45	1.5A	1.0M	T		
2N2025	S	N	2N4232	2N4231	SP	17.5W	C	200	80	60	0	20	60	2.0A	1.0	2.0A	1.0M	T		
2N2026	S	N	2N2218	2N2218	AH	0.6W	A	200	45	45	0	12	36	0.2A	6.0	0.2A	2.0M	T		
2N2027	S	N	2N3020	2N3019	AH	0.6W	A	200	75	75	0	12	36	0.2A	6.0	0.2A	2.0M	T		
2N2028	S	N	2N3053	2N3053	AH	0.6W	A	200	45	45	0	30	90	0.2A	6.0	0.2A	2.0M	T		
2N2029	S	N	2N3020	2N3019	AH	0.6W	A	200	75	75	0	30	90	0.2A	6.0	0.2A	2.0M	T		
2N2030	A	P		2N2042	A	200M	A	100	105	105	S	20	50	5.0M	0.75	100M	20	E	0.5M	B
2N2031	A	P		2N2042	A	200M	A	100	105	105	S	40	100	5.0M	0.75	100M	45	E	0.75M	B
2N2032	Thyristors, see Table on Page 2-70																			
2N2033	G	P	2N2955	2N2955	SH	150M	A	100	20	15	0	50	300	10M	0.14	10M			150M	T
2N2034	G	P	2N2955	2N2955	SH	150M	A	100	30	20	0	50	300	10M	0.14	10M			7.5K	E
2N2035	G	P	2N2219A	2N2218A	A	800M	A	200	75	50	R	100	300	150M	0.4	10M	75	E	50M	T
2N2036	G	P			S	60M	A	100	10	8.0	S	20		10M	0.2	10M			50M	T
2N2037	S	N	2N2060	2N2060	AM	500M	A	200	100	80	R	50	150	10M	1.2	50M	50	E	60M	T
2N2038	S	N	2N2060	2N2060	AM	0.5W	A	200	100	60	O	50	150	10M	0.6	50M	50	E	60M	T
2N2039	S	N																		
2N2040	S	N																		
2N2041	S	N																		
2N2042	G	P																		
2N2043	G	P																		
2N2044	G	P																		
2N2045	G	P																		
2N2046	G	P																		
2N2047	G	P																		
2N2048	G	P																		
2N2049	G	P																		
2N2050	G	P																		
2N2051	G	P																		
2N2052	G	P																		
2N2053	G	P																		
2N2054	G	P																		
2N2055	G	P																		
2N2056	G	P																		
2N2057	G	P																		
2N2058	G	P																		
2N2059	G	P																		
2N2060	G	P																		
2N2061	G	P																		
2N2062	G	P																		
2N2063	G	P																		
2N2064	G	P																		
2N2065	G	P																		
2N2066	G	P																		
2N2067	G	P																		
2N2068	G	P																		
2N2069	G	P																		
2N2070	G	P																		
2N2071	G	P																		
2N2072	G	P																		
2N2073	Thyristors, see Table on Page 2-70																			
2N2074	G	P																		
2N2075	G	P																		
2N2075A	G	P																		
2N2076	G	P																		
2N2076A	G	P																		
2N2077	G	P																		
2N2077A	G	P																		
2N2078	G	P																		
2N2078A	G	P																		
2N2079	G	P										</								



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	T <sub>J</sub> Ref Point °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub> (min)	Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub> (volts)	Units	h <sub>FE</sub> —	Subscript	f <sub>T</sub> Units	Subscript		
2N2079A	G	P		2N2075	AP	170W	C 110	80	80	S	35	70	5.0A	0.7	12A		5.0K	E		
2N2080	G	P		2N2075	AP	170W	C 110	70	70	S	35	70	5.0A	0.7	12A		5.0K	E		
2N2080A	G	P		2N2075	AP	170W	C 110	70	70	S	35	70	5.0A	0.7	12A		5.0K	E		
2N2081	G	P		2N2075	AP	170W	C 110	50	50	S	35	70	5.0A	0.9	12A		5.0K	E		
2N2081A	G	P		2N2075	AP	170W	C 110	50	50	S	35	70	5.0A	0.9	12A		5.0K	E		
2N2082	G	P		2N2075	AP	170W	C 110	40	40	S	35	70	5.0A	0.9	12A		5.0K	E		
2N2082A	G	P		2N2075	AP	170W	C 110	40	40	S	35	70	5.0A	0.9	12A		5.0K	E		
2N2083	G	P		A	AH	60M	A 85	30	20	O	25		1.0M				30M	T		
2N2084	G	P		A	AH	125M	A 100	40	20	O	40		1.0M							
2N2085	G	N		A	AH	150M	A 100	33	23	X	50	300	10M		40	E	6.0M	B		
2N2086	G	N	2N3020	2N3019	SH	600M	A 175	120	80	R	20		150M	0.7	150M		150M	T		
2N2087	S	N	2N3020	2N3019	SH	600M	A 175	120	80	R	40	120	150M	0.5	150M		150M	T		
2N2089	G	P		AH	AH	0.1W	A 85	20	20	R	40		1.0M		40	E	44M	T		
2N2090	G	P		AH	AH	0.1W	A 85	20	20	R	40		1.0M		40	E	44M	T		
2N2091	G	P		AH	AH	0.1W	A 85	20	20	R	40		1.0M		40	E	44M	T		
2N2092	G	P		AH	AH	0.1W	A 85	20	20	R	40		1.0M		40	E	44M	T		
2N2093	G	P		AH	AH	0.1W	A 85	25	25	R	40		1.0M		40	E	30M	T		
2N2095	G	P		AHP	AHP	1.0W	A 100	30	15	O							500M	T		
2N2096	G	P		SH	SH	250M	A 100	25	12	O	15		400M	0.6	200M					
2N2097	G	P		SH	SH	250M	A 100	40	20	O	20		400M	0.5	200M					
2N2098	G	P		AH	AH	1.0W	A 100	30	15	O							500M	T		
2N2099	G	P		SH	SH	250M	A 100	25	12	O	15		400M	0.6	200M					
2N2100	G	P		SH	SH	250M	A 100	40	20	O	20		400M	0.5	200M					
2N2100A	G	P		SH	SH	300M	A 100	40	20	O	20		400M	0.5	200M					
2N2101	S	N	2N5477	2N5477	AP	75W	C 200	60	40	O	15	60	1.0A	5.0	1.0A		25K	T		
2N2102	S	N		SH	SH	5.0W	A 200	120	80	R	35	120	150M	0.3	150M					
2N2102A	S	N		SH	SH	5.0W	A 200	120	80	R	35	120	150M	0.3	150M					
2N2104	S	N	2N3052	2N3052	SH	3.5W	C 200	50	35	O	25	80	150M	1.5	150M					
2N2105	S	N	2N3052	2N3052	SH	3.5W	C 200	50	35	O	15	40	150M	1.5	150M					
2N2106	S	N	2N3020	2N2019	A	1.0W	A 150	60	60	R	12	36	200M	5.0	200M					
2N2107	S	N	2N3020	2N3019	A	1.0W	A 150	60	60	R	30	90	200M	2.0	200M					
2N2108	S	N	2N3020	2N3019	A	1.0W	A 150	60	60	R	75	200	200M	2.0	200M					
2N2109	S	N	2N5885	2N5883	SP	250W	C 175	50	30	V	10		10A	1.5	10A					
2N2110	S	N	2N5629	2N5629	SP	250W	C 175	100	100	V	10		10A	1.5	10A					
2N2111	S	N	2N5629	2N5629	SP	250W	C 175	150	150	V	10		10A	1.5	10A					
2N2112	S	N	2N5631	2N5629	SP	250W	C 175	200	200	V	10		10A	1.5	10A					
2N2113	S	N		SP	SP	250W	C 175	250	250	V	10		10A	1.5	10A					
2N2114	S	N	2N5302	2N5301	SP	250W	C 175	300	300	V	10		10A	1.5	10A					
2N2116	S	N		SP	SP	250W	C 175	50	50	V	10		15A	1.5	15A					
2N2117	S	N		SP	SP	250W	C 175	100	100	V	10		15A	1.5	15A					
2N2118	S	N		SP	SP	250W	C 175	150	150	V	10		15A	1.5	15A					
2N2119	S	N		SP	SP	250W	C 175	200	200	V	10		15A	1.5	15A					
2N2120	S	N		SP	SP	250W	C 175	250	250	V	10		15A	1.5	15A					
2N2121	S	N		SP	SP	250W	C 175	300	300	V	10		15A	1.5	15A					
2N2123	S	N		SP	SP	250W	C 175	50	50	V	10		20A	1.5	20A					
2N2124	S	N		SP	SP	250W	C 175	100	100	V	10		20A	1.5	20A					
2N2125	S	N		SP	SP	250W	C 175	150	150	V	10		20A	1.5	20A					
2N2126	S	N		SP	SP	250W	C 175	200	200	V	10		20A	1.5	20A					
2N2127	S	N		SP	SP	250W	C 175	250	250	V	10		20A	1.5	20A					
2N2128	S	N		SP	SP	250W	C 175	300	300	V	10		20A	1.5	20A					
2N2130	S	N		SP	SP	250W	C 175	50	50	V	10		25A	1.5	25A					
2N2131	S	N		SP	SP	250W	C 175	100	100	V	10		25A	1.5	25A					
2N2132	S	N		SP	SP	250W	C 175	150	150	V	10		25A	1.5	25A					
2N2133	S	N		SP	SP	250W	C 175	200	200	V	10		25A	1.5	25A					
2N2134	S	N		SP	SP	250W	C 175	250	250	V	10		25A	1.5	25A					
2N2135	S	N		SP	SP	250W	C 175	300	300	V	10		25A	1.5	25A					
2N2137	G	P		AP	AP	62.5W	C 100	30	30	S	30	60	0.5A	0.5	2.0A		12K	E		
2N2137A	G	P		AP	AP	62.5W	C 100	30	20	O	30	60	0.5A	0.5	2.0A		12K	E		
2N2138	G	P		AP	AP	62.5W	C 100	45	45	S	30	60	0.5A	0.5	2.0A		12K	E		
2N2138A	G	P		AP	AP	62.5W	C 100	45	30	O	30	60	0.5A	0.5	2.0A		12K	E		
2N2139	G	P		AP	AP	62.5W	C 100	60	60	S	30	60	0.5A	0.5	2.0A		12K	E		
2N2139A	G	P		AP	AP	62.5W	C 100	60	45	O	30	60	0.5A	0.5	2.0A		12K	E		
2N2140	G	P		AP	AP	62.5W	C 100	75	75	S	30	60	0.5A	0.5	2.0A		12K	E		
2N2140A	G	P		AP	AP	62.5W	C 100	75	60	O	30	60	0.5A	0.5	2.0A		12K	E		
2N2141	G	P		AP	AP	62.5W	C 100	90	90	S	30	60	0.5A	0.5	2.0A		12K	E		
2N2141A	G	P		AP	AP	62.5W	C 100	90	65	O	30	60	0.5A	0.5	2.0A		12K	E		
2N2142	G	P		AP	AP	62.5W	C 100	30	30	S	50	100	0.5A	0.5	2.0A		12K	E		
2N2142A	G	P		AP	AP	62.5W	C 100	30	20	O	50	100	0.5A	0.5	2.0A		12K	E		
2N2143	G	P		AP	AP	62.5W	C 100	45	45	S	50	100	0.5A	0.5	2.0A		12K	E		
2N2143A	G	P		AP	AP	62.5W	C 100	45	30	O	50	100	0.5A	0.5	2.0A		12K	E		
2N2144	G	P		AP	AP	62.5W	C 100	60	60	S	50	100	0.5A	0.5	2.0A		12K	E		
2N2144A	G	P		AP	AP	62.5W	C 100	60	45	O	50	100	0.5A	0.5	2.0A		12K	E		
2N2145	G	P		AP	AP	62.5W	C 100	75	75	S	50	100	0.5A	0.5	2.0A		12K	E		
2N2145A	G	P		AP	AP	62.5W	C 100	75	60	O	50	100	0.5A	0.5	2.0A		12K	E		
2N2146	G	P		AP	AP	62.5W	C 100	90	90	S	50	100	0.5A	0.5	2.0A		12K	E		
2N2146A	G	P		AP	AP	62.5W	C 100	90	65	O	50	100	0.5A	0.5	2.0A		12K	E		
2N2147	G	P	2N2832	2N2832	AP	12.5W	C 100	75	50	O	100	300	1.0A	1.0	4.0A		3.0M	T		
2N2148	G	P	2N2832	2N2800	AP	12.5W	C 100	60	40	O	160		1.0A	1.0	4.0A		2.0M	T		
2N2150	S	N	2N5477	2N5477	AHP	30W	C 175	125	80	O	20	60	1.0A	1.0	1.0A		10M	T		
2N2151	S	N	2N5477	2N5477	AHP	30W	C 175	125	80	O	40	120	1.0A	1.0	1.0A		10M	T		
2N2152	G	P		AP	AP	170W	C 110	45	45	S	50	100	5.0A	0.1	5.0A		2.0K	E		
2N2152A	G	P		AP	AP	170W	C 110	45	30	O	50	100	5.0A	0.1	5.0A		2.0K	E		
2N2153	G	P		AP	AP	170W	C 110	60	60	S	50	100	5.0A	0.1	5.0A		2.0K	E		
2N2153A	G	P		AP	AP	170W	C 110	60	45	O	50	100	5.0A	0.1	5.0A		2.0K	E		
2N2154	G	P		AP	AP	170W	C 110	75	75	S	50	100	5.0A	0.1	5.0A		2.0K	E		
2N2154A	G	P		AP	AP	170W	C 110	75	60	O	50	100	5.0A	0.1	5.0A		2.0K	E		
2N2155	G	P		AP	AP	170W	C 110	90	90	S	50	100	5.0A	0.1	5.0A					



2N2156-2N2229

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE—</sub>	Subscript	f <sub>—</sub>	Subscript	
2N2156	G	P		2N2137	AP	170W	C	110	45	45	S	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2156A	G	P		2N2137	AP	170W	C	110	45	30	O	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2157	G	P		2N2137	AP	170W	C	110	60	60	S	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2157A	G	P		2N2137	AP	170W	C	110	60	45	O	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2158	G	P		2N2137	AP	170W	C	110	75	75	S	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2158A	G	P		2N2137	AP	170W	C	110	75	60	O	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2159	G	P		2N2137	AP	170W	C	110	90	90	S	80	160	5.0A	0.1	5.0A		2.0K	E	
2N2159A	G	P		2N2137	AP	170W	C	110	90	65	O	80	160	5.0A	0.1	5.0A		2.0K	E	
Unijunction Transistors, see Table on Page 2-88																				
2N2161	S	N	2N2222	2N2218	SH	200M	A	150	55	35	O	60	160	10M	1.5	10M	75	E		
2N2162	S	N	2N2946	2N2944	SC	150M	A	140	30	30	O						14M	T		
2N2163	S	P	2N2945	2N2944	SC	150M	A	140	15	15	O						14M	T		
2N2164	S	P	2N2944	2N2944	SC	150M	A	140	12	8.0	O						24M	T		
2N2165	S	P	2N2946	2N2944	SC	150M	A	140	15	15	O						10M	T		
2N2166	S	P	2N2945	2N2944	SC	150M	A	140	15	15	O						10M	T		
2N2167	S	P	2N2944	2N2944	SC	150M	A	140	12	8.0	O						16M	T		
2N2168	G	P			SH	60M	A	100	20	15	O	50	10M	0.125	10M					
2N2169	G	P			SH	60M	A	100	15	15	O	40	10M	0.15	10M					
2N2170	G	P			SH	60M	A	100	15	10	O	20	10M	0.18	10M					
2N2171	G	P		2N381	A	0.2W	A	100	50	25	R	110	20M							
2N2172	G	P			S	200M	A	85	20	15	O	30	150	10M	0.2	10M	0.97	E		
2N2173	G	P			SH	240M	A	100	25	15	O	30	200M	0.4	200M					
2N2175	S	P			A	0.1W	A	175	6.0	6.0	O	30	20*				10M	T		
2N2176	S	P			A	0.1W	A	175	6.0	6.0	O	30	20*				10M	T		
2N2177	S	P			A	0.1W	A	160	6.0	6.0	O	15	5.0*			50	E	8.0M		
2N2178	S	P			A	0.1W	A	160	6.0	6.0	O	15	5.0*			50	E	8.0M		
2N2180	G	P			SH	50M	A	100	15	6.0	O	100	10M	0.08	10M	120	E	60M		
2N2181	S	P	2N2945	2N2944	SC	150M	A	140	25	25	O	10	5.0M				6.0M	T		
2N2182	S	P	2N2945	2N2944	SC	150M	A	140	25	25	O	10	5.0M				6.0M	T		
2N2183	S	P	2N2944	2N2944	SC	150M	A	140	15	10	O	10	5.0M				6.0M	T		
2N2184	S	P	2N2944	2N2944	SC	150M	A	140	15	10	O	10	5.0M				6.0M	T		
2N2185	S	P	2N2946	2N2944	SC	150M	A	140	30	30	O						6.5M	T		
2N2186	S	P	2N2946	2N2944	SC	150M	A	140	30	30	O						6.5M	T		
2N2187	S	P	2N2946	2N2944	SC	150M	A	140	30	30	O						6.5M	T		
2N2188	G	P	2N3323	2N3323	AH	125M	A	85	40	25	O	40	160	1.5M			40	E		
2N2189	G	P	2N3323	2N3323	AH	125M	A	85	40	25	O	60	180	1.5M			40	E		
2N2190	G	P	2N3323	2N3323	AH	125M	A	85	60	25	O	40	160	1.5M			40	E		
2N2191	G	P	2N3323	2N3323	AH	125M	A	85	60	25	O	60	180	1.5M			40	E		
2N2192	S	N		2N2192	SH	800M	A	200	60	40	O	100	300	150M	0.35	150M				
2N2192A	S	N		2N2192	SH	800M	A	200	60	40	O	100	300	150M	0.25	150M				
2N2192B	S	N		2N2192	SH	800M	A	200	60	40	O	100	300	150M	0.18	150M				
2N2193	S	N		2N2192	SH	800M	A	200	80	50	O	40	120	150M	0.35	150M				
2N2193A	S	N		2N2192	SH	800M	A	200	80	50	O	40	120	150M	0.25	150M				
2N2193B	S	N		2N2192	SH	800M	A	200	80	50	O	40	120	150M	0.18	150M				
2N2194	S	N		2N2192	SH	800M	A	200	60	40	O	20	60	150M	0.35	150M				
2N2194A	S	N		2N2192	SH	800M	A	200	60	40	O	20	60	150M	0.25	150M				
2N2194B	S	N		2N2192	SH	800M	A	200	60	40	O	20	60	150M	0.18	150M				
2N2195	S	N		2N2192	SH	800M	A	200	45	25	O	20	150M	0.35	150M					
2N2195A	S	N		2N2192	SH	800M	A	200	45	25	O	20	150M	0.25	150M					
2N2195B	S	N		2N2192	SH	800M	A	200	45	25	O	20	150M	0.18	150M					
2N2196	S	N	2N3766	2N3766	AP	2.0W	A	175	80	60	R	30	90	0.2A	2.0	0.2A	30	E		
2N2197	S	N	2N3766	2N3766	AP	2.0W	A	175	80	60	R	75	200	0.2A	2.0	0.2A	30	E		
2N2198	S	N			AH	5.5M	A	200	80	80	O	35	55	0.2A	2.0	0.2A				
2N2199	G	P			AH	75M	A	100	15	10	O	9.0	9.0	3.0M			20	E		
2N2200	G	P			AH	75M	A	100	15	10	O	9.0	9.0	3.0M			20	E		
2N2201	S	N	2N5681	2N5681	A	1.0W	C	175	120	100	O	25	90	200M	1.7	200M	30	E		
2N2202	S	N	2N5681	2N5681	A	1.0W	C	175	120	100	O	25	90	200M	1.7	200M	30	E		
2N2203	S	N	2N5681	2N5681	A	1.0W	C	175	120	100	O	25	90	200M	1.7	200M	30	E		
2N2204	S	N	2N5681	2N5681	A	1.0W	C	175	120	100	O	25	90	200M	1.7	200M	30	E		
2N2205	S	N	2N835	2N834	SH	1.0W	C	175	25	12	O	20	10M	0.22	10M	2.0	E			
2N2206	S	N	2N835	2N834	SH	1.0W	C	175	25	12	O	40	120	10M	0.22	10M	2.0	E		
2N2207	G	P			AH	0.26W	A	75	70	50	R	36	370	10M			30	E		
2N2208	G	P			AH	120M	A	85	40	10	O	15	1.5M							
2N2209	G	P			S	150M	A	85	30	12	O	50	24M	0.15	12M		6.0M	B		
2N2210	G	P	2N2075	2N2075	AP	75W	C	100	100	65	S	25	50	5.0A	0.6	12A		5.0K		
2N2211	G	P			AHP	90W	C	100	80	60	S	60	140	1.0A	0.8	2.0A		5.0K		
2N2212	G	P			AHP	100W	C	110	120	120	R	50	120	5.0A	1.0	5.0A	30	E		
2N2214	S	N	2N835	2N834	SH	0.25W	C	150	25	15	O	25	10M	0.2	10M		200M	T		
2N2216	S	P	2N3498	2N3498	SH	3.0W	C	200	150	100	O	25	120	50M	5.0	50M		50M		
2N2217	S	N	2N2218	2N2218	SH	0.8W	A	175	60	30	O	20	60	150M	0.4	150M		250M		
2N2218	S	N	2N2218	2N2218	SH	0.8W	A	175	60	30	O	40	120	150M	0.4	150M		250M		
2N2218A	S	N			SH	0.8W	A	175	75	40	O	40	120	0.15A	0.3	0.15A	30	E		
2N2219	S	N			SH	0.8W	A	175	60	30	O	100	300	150M	0.4	150M		250M		
2N2219A	S	N			SH	0.8W	A	175	75	40	O	100	200	0.15A	0.3	0.15A	50	E		
2N2220	S	N	2N2222	2N2218	SH	0.5W	A	175	60	30	O	20	60	150M	9.4	150M		250M		
2N2221	S	N			SH	0.5W	A	175	60	30	O	40	120	150M	0.4	150M		250M		
2N2221A	S	N			SH	0.5W	A	175	75	40	O	40	120	0.15A	0.3	0.15A	30	E		
2N2222	S	N			SH	0.5W	A	175	60	30	O	100	300	150M	0.4	150M		250M		
2N2222A	S	N			SH	0.5W	A	175	75	40	O	100	300	0.15A	0.3	0.15A	50	E		
2N2222B	S	N	2N222A	2N2218	SH	1.8W	C	200	100	75										



2N2230-2N2330

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	Units					Units	Units
2N2230	S	N		MJ4033	AP	150W	C	150	50	50	V	350		9.0A	3.5	9.0A	100	E	4.0K	E	
2N2231	S	N		MJ4035	AP	150W	C	150	100	100	V	350		9.0A	3.5	9.0A	100	E	4.0K	E	
2N2232	S	N			AP	150W	C	150	150	150	V	350		9.0A	3.5	9.0A	100	E	4.0K	E	
2N2233	S	N			AP	150W	C	150	200	200	V	350		9.0A	3.5	9.0A	100	E	4.0K	E	
2N2234	S	N			SHP	12.5W	C	150	40	20	O	15	60	100M	0.25	100M			50M	T	
2N2235	S	N			SHP	12.5W	C	150	40	20	O	40	125	100M	0.25	100M			100M	T	
2N2236	S	N	2N2218	2N2218	SH	575M	A	150	40	20	O	15	60	100M	0.25	100M			50M	T	
2N2237	S	N	2N2218	2N2218	SH	575M	A	150	40	20	O	40	125	100M	0.25	100M			50M	T	
2N2238	G	P			AH	0.3W	A	100	30	30	S	10		10M		25	E	400M	T		
2N2239	S	N	2N4232	2N4231	A	1.0W	A	150	60	50	R	30	200	200M	3.0	200M					
2N2240	S	N	2N2218	2N2218	SH	0.6W	A	200	25	20	O	40	100	1.0M	1.0	50M			50M	T	
2N2241	S	N	2N2219A	2N2218	SH	0.6W	A	200	25	20	O	100	200	1.0M	1.0	50M			50M	T	
2N2242	S	N		2N2242	SH	360M	A	200	40	15	O	40	120	10M	0.7	100M			250M	T	
2N2243	S	N	2N3019	2N3019	SH	0.8W	A	200	120	80	O	40	120	0.15A	0.35	0.15A			50M	T	
2N2243A	S	N	2N3019	2N3019	SH	0.8W	A	200	120	80	O	40	120	0.15A	0.25	0.15A			50M	T	
2N2244	S	N			A	0.5W	A	200	20	20	O	5.0	15	2.0*	0.2	1.0M	40	E	60M	T	
2N2245	S	N			A	0.5W	A	200	20	20	O	10	30	2.0*	0.2	1.0M	80	E	60M	T	
2N2246	S	N			A	0.5W	A	200	20	20	O	5.0	15	2.0*	0.2	1.0M	40	E	60M	T	
2N2247	S	N			A	0.5W	A	200	45	45	O	5.0	15	2.0*	0.2	1.0M	40	E	60M	T	
2N2248	S	N			A	0.5W	A	200	45	45	O	10	30	2.0*	0.2	1.0M	80	E	60M	T	
2N2249	S	N			A	0.5W	A	200	45	45	O	20	60	2.0*	0.2	1.0M	150	E	60M	T	
2N2250	S	N			A	0.5W	A	200	25	20	O	5.0	15	2.0*	0.2	1.0M	40	E	60M	T	
2N2251	S	N			A	0.5W	A	200	25	20	O	10	30	2.0*	0.2	1.0M	80	E	60M	T	
2N2252	S	N			A	0.5W	A	200	25	20	O	20	60	2.0*	0.2	1.0M	150	E	60M	T	
2N2253	S	N			A	0.5W	A	200	45	50	O	5.0	15	2.0*	0.2	1.0M	40	E	60M	T	
2N2254	S	N			A	0.5W	A	200	45	50	O	10	30	2.0*	0.2	1.0M	80	E	60M	T	
2N2255	S	N			A	0.5W	A	200	45	50	O	20	60	2.0*	0.2	1.0M	150	E	60M	T	
2N2256	S	N		2N2256	SH	300M	A	175	7.0	7.0	S	17		10M							
2N2257	S	N		2N2256	SH	300M	A	175	7.0	7.0	S	40		10M							
2N2258	G	P		2N2256	SH	150M	A	100	7.0	7.0	S	17		10M							
2N2259	G	P		2N2256	SH	150M	A	100	7.0	7.0	S	40		10M							
2N2260	Thyristors, see Table on Page 2-70																				
2N2262	G	P	2N2145	2N2137	SP	50W	J	125	100	55	40	120	500M	0.75	5.0A			200K	T		
2N2266	G	P	2N2145	2N2137	SP	50W	J	125	120	55	40	120	500M	0.75	5.0A			200K	T		
2N2267	G	P	2N2145	2N2137	SP	50W	J	125	100	55	40	120	500M	0.75	5.0A			200K	T		
2N2268	G	P	2N2145	2N2137	SP	50W	J	125	100	55	40	120	500M	0.75	5.0A			200K	T		
2N2269	G	P	2N2145	2N2137	SP	50W	J	125	120	55	40	120	500M	0.75	5.0A			200K	T		
2N2270	S	N			A	0.5W	C	200	60	45	O	30		1.0M	0.9	150M	50	E			
2N2271	G	P			A	0.25W	A	100	20	15	R	50	100	35M				10K	E		
2N2272	S	N	2N929	2N929	SH	360M	A	200	40	20	R	80	240	10M			200M	3.0	E		
2N2273	G	P			AH	100M	A	100	25	15	O	20	150	1.0M							
2N2274	S	P	2N2946	2N2944	SC	150M	A	140	25	25	O	10		5.0M				6.0M	T		
2N2275	S	P	2N2946	2N2944	SC	150M	A	140	25	25	O	10		5.0M				6.0M	T		
2N2276	S	P	2N2944	2N2944	SC	150M	A	140	15	10	O	10		5.0M				6.0M	T		
2N2277	S	P	2N2944	2N2944	SC	150M	A	140	15	10	O	10		5.0M				6.0M	T		
2N2278	S	P	2N2945	2N2944	SC	150M	A	140	15	15	O							7.6M	T		
2N2279	S	P	2N2945	2N2944	SC	150M	A	140	15	15	O							7.6M	T		
2N2280	S	P	2N2944	2N2944	SC	150M	A	140	10	6.0	O			0.1	5.0M			16M	T		
2N2281	S	P	2N2944	2N2944	SC	150M	A	140	10	6.0	O			0.1	5.0M			16M	T		
2N2282	G	P			AHP	5.0W	C	110	60	30	O	15		3.0A	0.4	1.0A	40	E	20M	T	
2N2283	G	P			AHP	5.0W	C	110	100	60	O	15		3.0A	0.4	1.0A	40	E	20M	T	
2N2284	G	P			AHP	5.0W	C	110	200	100	O	15		3.0A	0.4	1.0A	40	E	20M	T	
2N2285	G	P		2N1651	AP	100W	C	110	60	30	O	35	140	10A	0.65	25A			0.6M	T	
2N2286	G	P		2N1651	AP	100W	C	110	100	60	O	35	140	10A	0.65	25A			0.6M	T	
2N2287	G	P		2N1651	AP	100W	C	110	120	80	O	35	140	10A	0.65	25A			0.6M	T	
2N2288	G	P		2N2288	AP	60W	C	110	40	40	R	20	60	5.0A	1.0	5.0A	25	E	0.45M	T	
2N2289	G	P		2N2288	AP	60W	C	110	80	80	R	20	60	5.0A	1.0	5.0A	25	E	0.45M	T	
2N2290	G	P		2N2288	AP	60W	C	110	120	120	R	20	60	5.0A	1.0	5.0A	25	E	0.45M	T	
2N2291	G	P		2N2291	AP	60W	C	110	40	30	O	50	120	5.0A	1.0	5.0A	50	E	0.45M	T	
2N2292	G	P		2N2291	AP	60W	C	110	80	70	O	50	120	5.0A	1.0	5.0A	50	E	0.45M	T	
2N2293	G	P		2N2291	AP	60W	C	110	120	70	O	50	120	5.0A	1.0	5.0A	50	E	0.45M	T	
2N2294	G	P			SP	70W	C	110	40	30	O	50	120	5.0A	1.0	5.0A	50	E	0.45M	T	
2N2295	G	P			SP	70W	C	110	80	50	O	50	120	5.0A	1.0	5.0A	50	E	0.45M	T	
2N2296	G	P			SP	70W	C	110	120	70	O	50	120	5.0A	1.0	5.0A	50	E	0.45M	T	
2N2297	S	N			AH	800M	A	200	80	35	O	40	120	150M	0.2	150M			60M	T	
2N2303	S	P		2N702	AH	600M	A	175	50	50	R	75	200	150M	1.5	150M	75	E	60M	T	
2N2304	S	N	2N4910	2N4910	AP	25W	C	200	60	60	V	20	80	300M	0.9	300M					
2N2305	S	N	2N5068	2N5067	AP	75W	C	200	60	60	V	15	60	800M	1.2	600M					
2N2306	S	N		SH	13W	C	175	75	50	O	12	75	0.35A	2.0	1.0A			175M	T		
2N2307	Unijunction Transistors, see Table on Page 2-88																				
2N2308	S	N	2N4912	2N4910	AP	25W	C	200	100	80	O	20	60	1.0A	1.0	1.0A	15	E	30K	E	
2N2309	S	N	2N2218	2N2218	A	600M	A	200	30	30	O	25	125	0.2M							
2N2310	S	N	2N3020	2N3019	A	350M	A	200	60	60	O	12	36	200M	5.0	200M					
2N2311	S	N			A	350M	A	200	100	100	O	12	36	200M	5.0	200M					
2N2312	S	N	2N3020	2N3019	A	350M	A	200	60	60	O	30	90	200M	5.0	200M					
2N2313	S	N			A	350M	A	200	100	100	O	30	90	200M	5.0	200M					
2N2314	S	N	2N2221A	2N2218	A	350M	A	200	60	40	R	20	60	150M	5.0	150M	15	E	40M	T	
2N2315	S	N	2N2221A	2N2218</																	



2N2331-2N2424

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(volts)		(min)	(max)						Units	Units
2N2331	S	N	2N5230	2N2330	SC	0.5W	A	150	30	20	0	50	10M				100M	T		
2N2332	S	P	2N5229	2N5229	SC	0.15W	A	200	15	15	0									
2N2333	S	P	2N5229	2N5229	SC	0.15W	A	200	15	5.0	0									
2N2334	S	P	2N5230	2N5229	SC	0.15W	A	200	30	15	0									
2N2335	S	P	2N5230	2N5229	SC	0.15W	A	200	30	15	0									
2N2336	S	P	2N5231	2N5229	SC	0.15W	A	200	50	35	0									
2N2337	S	P	2N5231	2N5229	SC	0.15W	A	200	50	35	0									
2N2338	S	N	2N5877	2N5875	AP	150W	C	200	60	40	0	7.0	6.0A	1.5	3.0A	12	E	15K		
2N2339	S	N	2N4910	2N4910	AP	40W	C	200	60	40	0	6.0	1.5A	1.5	0.3A	12	E	0.7M		
2N2340	S	N	2N4237		AHP	15W	C	175	50	40	0	10	40	750M	4.0	750M		550K		
2N2341	S	N	2N5334		AHP	15W	C	175	50	40	0	40	100	750M	4.0	750M		350K		
2N2342	S	N	2N4337		AHP	15W	C	175	100	40	0	10	40	750M	3.0	750M		550K		
2N2343	S	N	2N5334		AHP	15W	C	175	100	40	0	40	100	750M	2.5	750M		350K		
2N2344	Thyristors, see Table on Page 2-70																			
2N2348	S	N	2N929	2N929	A	150M	A	200	40	24	0	120	250	10M	1.5	10M	60	E	E	
2N2349	S	N	2N2222A	2N2218	SH	400M	A	200	60	40	0	100	300	150M	0.35	150M	2.5	E	E	
2N2350	S	N	2N2222A	2N2218	SH	400M	A	200	60	40	0	100	300	150M	0.25	150M	2.5	E	E	
2N2351	S	N	2N2193	2N2192	SH	400M	A	200	80	50	0	40	120	150M	0.35	150M	2.5	E	E	
2N2351A	S	N	2N2193	2N2192	SH	400M	A	200	80	50	0	40	120	150M	0.25	150M	2.5	E	E	
2N2352	S	N	2N2194	2N2192	SH	400M	A	200	60	40	0	20	60	150M	0.35	150M	2.5	E	E	
2N2352A	S	N	2N2194	2N2192	SH	400M	A	200	60	40	0	20	60	150M	0.25	150M	2.5	E	E	
2N2353	S	N	2N2221	2N2218	SH	400M	A	200	45	25	0	20		150M	0.35	150M	2.5	E	E	
2N2353A	S	N	2N2221	2N2218	SH	400M	A	200	45	25	0	20		150M	0.25	150M	2.5	E	E	
2N2354	G	N			A	0.18W	A	85	20	15	R	50	150	35M						
2N2356	S	N			SC	0.6W	A	200	25	7.0	0								50M	
2N2356A	S	N			SC	0.6W	A	200	25	7.0	0								50M	
2N2357	G	P		2N2357	SP	170W	C	110	60	30	0	30	90	20A	0.9	50A	20	E	0.6M	
2N2358	G	P		2N2357	SP	170W	C	110	100	60	0	30	90	20A	0.9	50A	20	E	0.6M	
2N2359	G	P		2N2357	SP	170W	C	110	120	80	0	30	90	20A	0.9	50A	20	E	0.6M	
2N2360	G	P	2N3283	2N3283	AH	60M	A	125	20	20	0	10		2.0M						
2N2361	G	P	2N3284	2N3283	AH	60M	A	125	20	20	0	10		2.0M						
2N2362	G	P	2N3284	2N3283	AH	60M	A	100	20	20	S	10		2.0M						
2N2363	G	P			AH	75M	A	100	30	20	0	10	200	2.0M			10	E	250M	
2N2364	S	N	2N3020	2N3019	SH	400M	A	200	120	80	0	40	120	150M	0.35	150M			50M	
2N2364A	S	N			SH	400M	A	200	120	80	0	40	120	150M	0.25	150M			50M	
2N2368	S	N			SH	360M	A	200	40	40	S	20	60	10M	0.25	10M			400M	
2N2369	S	N			SH	360M	A	200	40	40	S	40	120	10M	0.25	10M			500M	
2N2369A	S	N			SH	360M	A	200	40	40	S		120	10M	0.2	10M			500M	
2N2370	S	P			L	0.2W	A	200	15	15	0	15		25*			15	E	E	
2N2371	S	P			L	0.2W	A	200	15	15	0	20		25*			15	E	E	
2N2372	S	P			L	0.15W	A	200	15	15	0	15		25*			15	E	E	
2N2373	S	P			L	0.15W	A	200	15	15	0	20		25*			15	E	E	
2N2374	G	P			A	250M	A	100	35	35	S	100	300	100M			100	E	E	
2N2375	G	P			A	250M	A	100	35	35	S	35	110	100M			35	E	E	
2N2376	G	P	2N1193	2N1191	A	250M	A	100	35	35	S	35	110	100M			35	E	E	
2N2377	S	P	2N3250	2N3250	AH	150M	A	140	25	25	0	10	100	5.0M			15	E	8.0M	
2N2378	S	P			AH	150M	A	140	10	10	0	15		15M					7.2M	
2N2379	G	P			SP	150W	C	95	100	80	S	25	37	5.0A	1.0	15A			4.0K	
2N2380	S	N	2N2193	2N2192	SH	600M	A	175	80	40	0	20	120	150M	1.3	150M			100M	
2N2380A	S	N	2N2193	2N2192	SH	600M	A	175	80	40	0	20	120	150M	1.3	150M	60	E	100M	
2N2381	G	P			SH	300M	A	100	30	15	0	40	200M	0.40	200M			300M	T	
2N2382	G	P			SH	300M	A	100	45	20	0	40	200M	0.40	200M			300M	T	
2N2383	S	N	2N4914	2N4913	AP	85W	C	180	80	60	0	20	60	1.5A	1.0	1.5A	15	E	30K	
2N2384	S	N	2N4914	2N4913	AP	85W	C	180	80	60	0	20	60	1.5A	1.0	1.5A	15	E	30K	
2N2386,A	Field-Effect Transistors, see Table on Page 2-81																			
2N2387	S	N			A	300M	A	175	45	45	0	40	120	10*	1.0	10M	60	E	30M	
2N2388	S	N			A	300M	A	175	45	45	0	100	300	10*	1.0	10M	150	E	30M	
2N2389	S	N	2N2193	2N2192	A	450M	A	200	75	50	R	40	120	150M	1.5	150M	30	E	60M	
2N2390	S	N	2N3019	2N3019	A	450M	A	200	75	50	R	100	300	150M	1.5	150M	50	E	70M	
2N2391	S	P	2N3250	2N3250	A	300M	A	175	25	20	0	15	45	10M	0.6	10M	15	E	140M	
2N2392	S	P	2N3250	2N3250	A	300M	A	175	25	20	0	30	90	10M	0.6	10M	30	E	140M	
2N2393	S	P	2N2905	2N2904	A	450M	A	175	50	35	0	20	45	150M	1.5	150M	15	E	50M	
2N2394	S	P	2N2905	2N2904	A	450M	A	175	50	35	0	30	90	150M	1.5	150M	25	E	60M	
2N2395	S	N	2N2219	2N2218	A	450M	A	200	60	40	0	20	60	150M	1.0	150M			40M	
2N2396	S	N	2N2219	2N2218	A	450M	A	200	60	40	0	40	120	150M	1.0	150M			50M	
2N2397	S	N	2N369A	2N369A	SH	300M	A	200	35	15	0	25	120	10M	0.30	10M			200M	
2N2398	G	P	2N3284	2N3283	AH	60M	A	100	20	20	S	10		2.0M						
2N2399	G	P	2N3284	2N3283	AH	60M	A	100	20	20	S	10		2.0M						
2N2400	G	P	2N964	2N960	SH	150M	A	100	12	7.0	0	30		10M	0.22	10M			150M	
2N2401	G	P	2N964	2N960	SH	150M	A	100	15	10	0	50		10M	0.2	10M			200M	
2N2402	G	P	2N2956	2N2955	SH	150M	A	100	18	12	0	60		10M	0.2	10M			250M	
2N2403	S	N			S	1.0W	A	200	60	60	0	20	60	0.6A	1.5	0.6A			147M	
2N2404	S	N			S	1.0W	A	200	60	60	0	40	120	0.6A	1.5	0.6A			147M	
2N2405	S	N	2N1893		S	5.0W	C		120	90	0	60	200	150M	0.5	150M	50	E		
2N2410	S	N	2N2410	SH	800M	A	200	60	30	0	30	120	10M						200M	
2N2411	S	P			SH	300M	A	200	25	20	0	20	60	10M	0.2	10M			140M	
2N2412	S	P			SH	300M	A	200	25	20	0	40	120	10M	0.2	10M			140M	
2N2413	S	N	2N2221	2N2218	AH	300M	A	175	40	18	0	30	120	10M	0.4	10M			300M	
2N2414	S	N			AL	500M	A	200	60	40	R	50	250	10M	1.2	50M			50M	
2N2415	G	P			AH	75M	A	100	15	10	0	10	200	2.0M			15	E	500M	
2N2416	G	P		</																



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>		Subscript		
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)			Units	Units		Units	
2N2425	S	P	2N3250A	2N3250	A	375M	A	160	50	10	25	110	5.0M	0.3	15M			10M	B	E	
2N2426	G	N			AH	150M	A	100	40	25	0			0.5	100M	35	E	25K			
2N2427	S	N			AH	0.5W	A	200	40	40	20	60	10*			40	E	50M			
2N2428	G	P	2N652	2N650	A	0.5W	A	75	32	32	50	150	2.0M			80	E	10K			
2N2429	G	P	2N652	2N650	A	0.5W	A	75	32	32	65	300	2.0M			130	E	10K			
2N2430	G	N			A	0.28W	A	75	32	32	60	210	0.1A					10K			
2N2431	G	P			A	0.55W	A	90	32	32	60	175	0.3A					10K			
2N2432	S	N			SC	300M	A	175	30	30	50		1.0M	0.15	10M			20M	T		
2N2432A	S	N			SC	300M	A	175	45	45	50		1.0M					20M	T		
2N2433	S	N	2N2193	2N2192	SH	500M	A	200	75	45	0	40	120	150M	1.5	150M	30	E	80M	T	
2N2434	S	N			SH	500M	A	200	75	45	0	100	300	150M	1.5	150M	50	E	90M	T	
2N2435	S	N	2N3020	2N3019	SH	500M	A	200	120	80	0	40	120	150M	3.0	150M	30	E	80M	T	
2N2436	S	N	2N3019	2N3019	SH	500M	A	200	120	80	0	100	300	150M	3.0	150M	50	E	90M	T	
2N2437	S	N	2N3020	2N3019	AH	500M	A	200	100	75	0	15	10M	0.2	10M	18	E	70M	T		
2N2438	S	N	2N3019	2N3019	AH	500M	A	200	100	75	0	35	10M	0.4	50M	36	E	80M	T		
2N2439	S	N	2N3019	2N3019	AH	500M	A	200	100	75	0	75	10M	0.4	50M	76	E	90M	T		
2N2440	S	N	2N3019	2N3019	SH	300M	A	200	120	80	100	300	150M	0.4	50M	50	E	90M	T		
2N2443	S	N	2N3500	2N3498	AH	800M	A	200	120	100	0	50	150	50M	1.2	50M	45	E	50M	T	
2N2444	G	P			AP	85W	C	110	80	80	0	90	120	3.0A	1.0	5.0A	50	E	4.5M	T	
2N2445	G	P			AP	90W	C	100	100	50	0	30	60	10A	1.0	10A	30	E	0.1M	T	
2N2446	G	P			SP	90W	C	100	60	50	15	45	5.0A	1.5	7.0A			3.0K		E	
2N2447	G	P	2N1187	2N1175	A	75M	A	85	45	24	0					25	E				
2N2448	G	P	2N1187	2N1175	A	75M	A	85	45	24	0					25	E				
2N2449	G	P	2N652	2N650	A	75M	A	85	35	20	0					50	E				
2N2450	G	P	2N652	2N650	A	75M	A	85	35	20	0					50	E				
2N2451	G	P			SH	25M	A	85	6.0	5.0	25		10M	0.1	10M	40	E	80M		T	
2N2452	S	N			AL	500M	A	200	100	80	0										
2N2453	S	N		2N2453	AM	0.5W	A	200	60	30	150	600	1.0M	1.0	5.0M	150	E	60M		T	
2N2453A	S	N		2N2453	AM	0.5W	A	200	80	50	150	600	1.0M	1.0	5.0M	150	E	60M		T	
2N2454	Thyristors, see Table on Page 2-70																				
2N2455	G	P			SH	150M	A	100	15	15	20	100	2.0M	0.19	10M	30	E	600M		T	
2N2456	G	P			SH	150M	A	100	15	15	20	100	2.0M	0.19	10M	30	E	1.0G		T	
2N2459	S	N			A	0.4W	A	200	100	60	0	10	0.1M	0.3	10M	40	E	100M		T	
2N2460	S	N			A	0.4W	A	200	100	60	0	20	0.1M	0.3	10M	70	E	120M		T	
2N2461	S	N			A	0.4W	A	200	100	60	0	40	0.1M	0.3	10M	115	E	140M		T	
2N2462	S	N			A	0.4W	A	200	100	60	0	60	0.1M	0.3	10M	160	E	160M		T	
2N2463	S	N			A	0.5W	A	200	100	60	0	10	0.1M	0.3	10M	40	E	100M		T	
2N2464	S	N			A	0.5W	A	200	100	60	0	20	0.1M	0.3	10M	70	E	120M		T	
2N2465	S	N			A	0.5W	A	200	100	60	0	40	0.1M	0.3	10M	115	E	140M		T	
2N2466	S	N			A	0.5W	A	200	100	60	0	60	0.1M	0.3	10M	160	E	160M		T	
2N2467	G	P			AP	5.0W	C	110	60	30	30	90	0.5A	0.4	1.0A	40	E	20M		T	
2N2468	G	P			AP	5.0W	C	110	100	60	0	30	0.5A	0.4	1.0A	40	E	20M		T	
2N2469	G	P			AP	5.0W	C	110	200	100	0	30	0.5A	0.4	1.0A	40	E	20M		T	
2N2472	S	N	2N3500	2N3498	AP	1.0W	A	175	120	100	0	30	0.2A	1.7	0.2A	30	E	10M		T	
2N2473	S	N	2N3500	2N3498	AP	1.0W	A	175	120	100	0	30	0.2A	1.7	0.2A	30	E	10M		T	
2N2474	S	P			AP	250M	A	160	30	15	8.0		100*	0.126	10M	8.0	E				
2N2475	S	N	2N835	2N834	SH	300M	A	200	15	6.0	0	20	50M			6.0	E				
2N2476	S	N		2N2476	SH	2.0W	C	200	60	20	0	20	150M	0.4	150M			250M		T	
2N2477	S	N		2N2476	SH	2.0W	C	200	60	20	0	40	150M	0.4	150M			250M		T	
2N2478	S	N	2N2218	2N2218	SH	600M	A	175	120	40	0	30	120	150M	0.7	150M		200M		T	
2N2479	S	N	2N2218	2N2218	SH	600M	A	175	80	40	0	30	350	1.0M	0.85	150M	60	E	150M		T
2N2480	S	N			AM	0.3W	A	200	75	40	0	30	200	1.0M	1.3	50M		50M		T	
2N2480A	S	N			AM	0.3W	A	200	80	40	0	50	200	1.0M	1.2	50M	50	E	50M		T
2N2481	S	N			SH	1.2W	C	200	40	15	0	40	120	10M	0.25	10M		300M		T	
2N2482	G	N			AH	150M	A	200	15	15	25	200	2.0M			15	E				
2N2483	S	N	MM2483	MM2483	A	360M	A	200	60	60	0	40	120	10*	0.35	1.0M	80	E	12M	T	
2N2484	S	N	MM2484	MM2484	A	360M	A	200	60	60	0	100	500	10*	0.35	1.0M	150	E	15M	T	
2N2484A	S	N			A	360M	A	200	60	60	0	100	500	10*	0.35	1.0M	150	E	60M	T	
2N2485	S	N			AHP	8.8W	C	200	120	120	0	10	0.5A					100M		T	
2N2486	S	N			AHP	8.8W	C	200	140	140	0	10	0.5A					100M		T	
2N2487	G	P			SH	60M	A	100	15	10	0	20	10M	0.175	40M			360M		T	
2N2488	G	P			SH	60M	A	100	15	10	0	20	50M	0.175	15M			360M		T	
2N2489	G	P			SH	60M	A	100	20	15	0	20	10M	0.18	10M			300M		T	
2N2490	G	P		2N2490	SP	170W	C	110	70	60	20	40	5.0A	0.7	12A			5.0K		E	
2N2491	G	P		2N2490	SP	170W	C	110	60	50	25	70	5.0A	0.7	12A			5.0K		E	
2N2492	G	P		2N2490	SP	170W	C	110	80	70	25	50	5.0A	0.5	12A			5.0K		E	
2N2493	G	P		2N2490	SP	170W	C	110	100	85	25	50	5.0A	0.5	12A			5.0K		E	
2N2494	G	P			AH	83M	A	75	20	20	25		1.0M								
2N2495	G	P			AH	125M	A	100	40	40	25		1.0M								
2N2496	G	P			AH	100M	A	100	40	20	25		1.0M								
2N2497 thru 2N2500	Field-Effect Transistors, see Table on Page 2-81																				
2N2501	S	N		2N2501	SH	0.36W	A	200	40	20	0	50	150	10M	0.2	10M		350M		T	
2N2502 thru 2N2508	Thyristors, see Table on Page 2-70																				
2N2509	S	N			AH	1.2W	C	200	125	80	0	25	500	10*	1.0	5.0M		45M		T	
2N2510	S	N			AH	1.2W	C	200	100	65	0	150	10M	1.0	5.0M		45M				
2N2511	S	N			AH	1.2W	C	200	80	50	0	240	750	1.0M	1.0	5.0M		45M		T	
2N2512	G	P			A	0.15W	A	75	70	70	20		1.0M			40	E	140M		T	
2N2514	S	N			A	0.4W	A	200	80	60	0	15	5.0M	0.5	10M	20	E	30M		T	
2N2515	S	N			A	0.4W	A	200	80	60	0	30	100	5.0M	0.5	10M	40	E	60M	T	
2N2516	S	N			A	0.4W	A	200	80	60	0	60	200	5.0M	0.5	10M	80	E	100M	T	
2N2517	S	N			A	0.4W	A														



## 2N2522-2N2617

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript	
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	Units					Units
2N2522	S	N			A	0.4W	A	200	60	60	0	50	120	1.0M	0.5	10M	76	50M	B	T
2N2523	S	N			A	0.4W	A	200	60	45	0	40	300	10*	0.5	10M	60	45M	T	T
2N2524	S	N			A	0.4W	A	200	60	45	0	100	300	10*	0.5	10M	150	45M	T	T
2N2525	S	N			AHP	25W	C	200	100	80	0	10		0.35A	0.8	1.0A		154M	T	T
2N2526	G	P		2N2526	SHP	85W	C	110	80	80	0	20	50	3.0A	0.8	10A		30K	T	T
2N2527	G	P		2N2526	SHP	85W	C	110	120	120	0	20	50	3.0A	0.8	10A		30K	T	T
2N2528	G	P		2N2526	SHP	85W	C	110	160	160	0	20	50	3.0A	0.8	10A		30K	T	T
2N2529	S	N	2N929	2N929	A	150M	A	175	45	40	0	10	20	1.0M	2.0	10M	12	6.0M	B	B
2N2530	S	N	2N929	2N929	A	150M	A	175	45	40	0	12	35	1.0M	2.0	10M	18	10M	B	B
2N2531	S	N	2N929	2N929	A	150M	A	175	45	40	0	20	80	1.0M	2.0	10M	36	12M	B	B
2N2532	S	N	2N929	2N929	A	150M	A	175	45	40	0	45	185	1.0M	2.0	10M	76	16M	B	B
2N2533	S	N	2N929	2N929	A	150M	A	175	45	40	0	20	55	1.0M	1.5	10M	19	10M	E	T
2N2534	S	N	2N929	2N929	A	150M	A	175	45	40	0	45	150	1.0M	1.5	10M	39	20M	B	E
2N2535	S	P		A	10W	C	100	60	30	0	40	120	0.4A	0.5	1.0A	15	8.0K	E	E	
2N2536	G	P		A	10W	C	100	80	40	0	40	120	0.4A	0.5	1.0A	15	8.0K	E	E	
2N2537	G	P		2N2537	SH	0.8W	A	200	60	30	0	50	150	150M	0.45	150M		250M	T	T
2N2538	G	P		2N2537	SH	0.8W	A	200	60	30	0	100	300	150M	0.45	150M		250M	T	T
2N2539	G	P		2N2537	SH	0.5W	A	200	60	30	0	50	150	150M	0.45	150M		250M	T	T
2N2540	S	N		2N2537	SH	0.5W	A	200	60	30	0	100	300	150M	0.45	150M		250M	T	T
2N2541	G	P		2N2537	S	215M	A	100	30	14	0	60	250	50M	0.25	50M		10M	B	B
2N2542 thru 2N2550	Thyristors, see Table on Page 2-70																			
2N2551	S	P		A	0.4W	A	200	150	150	0	15	45	0.1A	1.2	0.1A					
2N2552	G	P		2N2552	AP	20W	C	100	40	40	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2553	G	P		2N2552	AP	20W	C	100	60	60	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2554	G	P		2N2552	AP	20W	C	100	80	80	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2555	G	P		2N2552	AP	20W	C	100	100	100	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2556	G	P		2N2556	AP	20W	C	100	40	40	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2557	G	P		2N2556	AP	20W	C	100	60	60	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2558	G	P		2N2556	AP	20W	C	100	80	80	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2559	G	P		2N2556	AP	20W	C	100	100	100	V	20	60	1.0A	0.25	1.0A	18	225K	T	T
2N2560	G	P		2N2560	AP	20W	C	100	40	40	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2561	G	P		2N2560	AP	20W	C	100	60	60	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2562	G	P		2N2560	AP	20W	C	100	80	80	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2563	G	P		2N2560	AP	20W	C	100	100	100	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2564	G	P		2N2564	AP	20W	C	100	40	40	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2565	G	P		2N2564	AP	20W	C	100	60	60	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2566	G	P		2N2564	AP	20W	C	100	80	80	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2567	G	P		2N2564	AP	20W	C	100	100	100	V	20	60	3.0A	0.75	3.0A	25	250K	T	T
2N2568	G	N		AHP	1.0W	C	100	32	32	S	10	60	40M	0.75	100M		600M	T	T	
2N2569	S	N		SC	300M	A	200	20	5.0	O	50		100*				100M	T	T	
2N2570	S	N		SC	300M	A	200	20	5.0	O	50		100*				100M	T	T	
2N2571	S	N		SC	300M	A	200	20	15	O	50		100M				100M	T	T	
2N2572	S	N		SC	300M	A	200	20	15	O	50		100M				100M	T	T	
2N2573 thru 2N2579	Thyristors, see Table on Page 2-70																			
2N2580	S	N			SP	150W	C	150	400	400	0	10	40	5.0A	0.7	5.0A		30K	E	E
2N2581	S	N			SP	150W	C	150	400	400	0	25	65	5.0A	1.0	10A		30K	E	E
2N2582	S	N			SP	150W	C	150	500	500	0	10	40	5.0A	0.7	5.0A		30K	E	E
2N2583	S	N			SP	150W	C	150	500	500	0	25	65	5.0A	1.0	10A		30K	E	E
2N2584	S	N			SP	150W	C	150	600	600	0	10	40	5.0A	0.7	5.0A		30K	E	E
2N2585	S	N			SP	150W	C	150	600	600	0	25	65	5.0A	1.0	10A		30K	E	E
2N2586	S	N			A	300M	A	175	60	45	O	120	360	10*	0.5	10M	150	1.5K	T	T
2N2587	G	P		AH	150M	A	100	30	30	S	15	100	8.0M	0.5	50M	0.95	320M	T	T	
2N2588	G	P		AH	150M	A	100	40	20	O	50	150	1.5M			50	75M	T	T	
2N2589	S	N		SP	150W	C	200	150	150	O	17	51	7.0A	1.05	7.0A	5.0	0.25M	T	T	
2N2590	S	P		AH	0.4W	A	200	100	60	O	10		0.1M	0.4	10M	40	50M	T	T	
2N2591	S	P		AH	0.4W	A	200	100	60	O	20		0.1M	0.4	10M	70	70M	T	T	
2N2592	S	P		AH	0.4W	A	200	100	60	O	40		0.1M	0.4	10M	115	90M	T	T	
2N2593	S	P		AH	0.4W	A	200	100	60	O	60		0.1M	0.4	10M	160	110M	T	T	
2N2594	S	N	2N5336	2N5336	A	5.0W	C	200	80	90	R	50	150	100M	1.0	200M	15	40M	T	T
2N2595	S	P	2N3496	2N3494	AH	0.4W	A	200	80	60	O	15	60	5.0M	0.5	10M	20	30M	T	T
2N2596	S	P	2N3496	2N3494	AH	0.4W	A	200	80	60	O	30	120	5.0M	0.5	10M	40	40M	T	T
2N2597	S	P	2N3496	2N3494	AH	0.4W	A	200	80	60	O	60	240	5.0M	0.5	10M	80	60M	T	T
2N2598	S	P	2N3497	2N3494	AH	0.4W	A	200	125	80	O	15	60	5.0M	0.5	10M	20	30M	T	T
2N2599	S	P	2N3497	2N3494	AH	0.4W	A	200	125	80	O	30	120	5.0M	0.5	10M	40	40M	T	T
2N2599A	S	P	2N3497	2N3494	AH	0.4W	A	200	125	100	O	30	120	5.0M	0.5	10M	40	40M	T	T
2N2600	S	P	2N3497	2N3494	AH	0.4W	A	200	125	80	O	60	240	5.0M	0.5	10M	80	60M	T	T
2N2600A	S	P	2N3497	2N3494	AH	0.4W	A	200	125	100	O	60	240	5.0M	0.5	10M	80	60M	T	T
2N2601	S	P	2N3798	2N3798	AH	0.4W	A	200	60	60	O	12		1.0M	0.5	10M	18	20M	T	T
2N2602	S	P	2N3798	2N3798	AH	0.4W	A	200	60	60	O	25		1.0M	0.5	10M	36	40M	T	T
2N2603	S	P	2N3799	2N3798	AH	0.4W	A	200	60	60	O	50		1.0M	0.5	10M	76	60M	T	T
2N2604	S	P		2N2604	AH	0.4W	A	200	60	45	O	40		10*	0.5	10M	60	30M	T	T
2N2605	S	P	2N3798	2N2798	AH	0.4W	A	200	60	45	O	100		10*	0.5	10M	150	30M	T	T
2N2605A	S	P		AH	0.4W	A	200	60	45	O	50	200	1.0*	0.25	10M	200	45M	T	T	
2N2606 thru 2N2609	Field-Effect Transistors, see Table on Page 2-81																			
2N2610	S	N	2N929	2N929	A	0.15W	A	150	45	40	O	7.0	36	0.2A	1.0	5.0M	4.5	4.0M	T	T
2N2611	S	N	2N3766	2N3766	AP	2.0W	A	175	120	100	O	85	250	0.2A	1.0	10A	12	60M	T	T
2N2612	G	P	2N1559	2N																



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript					
						@ 25°C	°C	(volts)	(volts)							(min)	(max)	Units	Units	Units
2N2618	S	N	2N2219	2N2218	AH	0.6W	A	200	60	40	0	25	10M			30	E	200M	T	
2N2619	Thyristors, see Table on Page 2-70																			
2N2620	Field-Effect Transistors, see Table on Page 2-81																			
2N2621	G	P			AH	150M	J	100	15	15	S	15	1.0M							
2N2622	G	P			AH	150M	J	100	24	24	S	15	1.0M							
2N2623	G	P			AH	150M	J	100	32	32	S	20	1.0M							
2N2624	G	P			AH	150M	J	100	15	15	S	20	1.0M							
2N2625	G	P			AH	150M	J	100	24	24	S	15	1.0M							
2N2626	G	P			AH	150M	J	100	32	32	S	20	1.0M							
2N2627	G	P			AH	150M	J	100	15	15	S	15	1.0M							
2N2628	G	P			AH	150M	J	100	24	24	S	15	1.0M							
2N2629	G	P			AH	150M	J	100	32	32	S	10	1.0M							
2N2630	G	P			SH	300M	A	100	18	10	0	25	100M	0.45	100M	3.0	E			
2N2631	S	N	2N3553	2N3375	A	8.75W	C	200	80	80	V	8.0	200M							
2N2632	S	N	2N5477	2N5477	AP	40W	C	175	90	60	0	40	120	1.0A	0.25	1.0A	40	E	20M	T
2N2633	S	N	2N5477	2N5477	AP	40W	C	175	120	80	0	40	120	1.0A	0.25	1.0A	40	E	20M	T
2N2634	S	N	2N5479	2N5477	AP	40W	C	175	150	100	0	40	120	1.0A	0.25	1.0A	40	E	20M	T
2N2635	G	P		2N2635	SH	150M	A	100	30	12	0	45	300	50M	0.2	10M			150M	T
2N2636	G	P			SP	100W	C	110	100	60	0	20	80	25A	0.65	25A			0.6M	T
2N2637	G	P			SP	100W	C	110	100	60	0	20	80	25A	0.65	25A			0.6M	T
2N2638	G	P			SP	100W	C	110	100	60	0	20	80	25A	0.65	25A			0.6M	T
2N2639	S	N		2N2639	AM	300M	A	200	45	45	0	50	300	10*	1.0	10M	65	E	35M	T
2N2640	S	N		2N2639	AM	300M	A	200	45	45	0	50	300	10*	1.0	10M	65	E	35M	T
2N2641	S	N		2N2639	AM	300M	A	200	45	45	0	50	300	10*	1.0	10M	65	E	35M	T
2N2642	S	N		2N2639	AM	300M	A	200	45	45	0	100	300	10*	1.0	10M	130	E	35M	T
2N2643	S	N		2N2639	AM	300M	A	200	45	45	0	100	300	10*	1.0	10M	130	E	35M	T
2N2644	S	N		2N2639	AM	300M	A	200	45	45	0	100	300	10*	1.0	10M	130	E	35M	T
2N2645	S	N			AM	500M	A	200	75	50	R	100	300	150M	0.4	10M	75	E	50M	T
2N2646	Unijunction Transistors, see Table on Page 2-88																			
2N2647	G	P			S	5.0W	C	100	35	10	0	80	500	1.0A	0.4	1.0A			10M	T
2N2648	G	P			AHP	8.7W	C	200	65	65	0	10		0.5A					100M	T
2N2649	S	N			AHP	8.7W	C	200	140	140	0	10		0.5A					100M	T
2N2650	S	N	2N2501	2N2501	SH	360M	A	200	40	20	0	25	10M	0.25	10M			350M	T	T
2N2651	S	N		2N2652	AM	0.3W	A	200	100	60	0	50	200	1.0M	1.2	50M	50	E	60M	T
2N2652	S	N		2N2652	AM	0.3W	A	200	100	60	0	50	200	1.0M	1.2	50M	50	E	60M	T
2N2652A	S	N																		
2N2653	Thyristors, see Table on Page 2-70																			
2N2654	G	P			AH	0.1W	A	75	25		0	25	90	1.0M						
2N2655	S	N	2N5681	2N5681	AP	15W	C	200	100	100	0	30	90	0.2A	2.0	0.2A	30	E	0.25M	E
2N2656	S	N	2N2222	2N2218	AH	0.36W	A	200	25	15	0	40	160	0.1M	0.5	1.0M			250M	T
2N2657	S	N	2N5336	2N5336	SP	1.25W	A	200	80	60	0	40	120	1.0A	0.5	1.0A			20M	T
2N2658	S	N	2N5336	2N5336	SP	1.25W	A	200	100	80	0	40	120	1.0A	0.5	1.0A			20M	T
2N2659	G	P			AP	15W	C	100	50	50	V	30	90	500M	0.2	500M	30	E	280K	T
2N2660	G	P			AP	15W	C	100	70	70	V	30	90	500M	0.2	500M	30	E	280K	T
2N2661	G	P			AP	15W	C	100	90	90	V	30	90	500M	0.2	500M	30	E	280K	T
2N2662	G	P			AP	15W	C	100	50	50	V	30	90	500M	0.2	500M	30	E	280K	T
2N2663	G	P			AP	15W	C	100	70	70	V	30	90	500M	0.2	500M	30	E	280K	T
2N2664	G	P			AP	15W	C	100	90	90	V	30	90	500M	0.2	500M	30	E	280K	T
2N2665	G	P			AP	15W	C	100	50	50	V	50	150	500M	0.2	500M	50	E	300K	T
2N2666	G	P			AP	15W	C	100	70	70	V	50	150	500M	0.2	500M	50	E	300K	T
2N2667	G	P			AP	15W	C	100	90	90	V	50	150	500M	0.2	500M	50	E	300K	T
2N2668	G	P			AP	15W	C	100	50	50	V	50	150	500M	0.2	500M	50	E	300K	T
2N2669	G	P			AP	15W	C	100	70	70	V	50	150	500M	0.2	500M	50	E	300K	T
2N2670	G	P			AP	15W	C	100	70	70	V	50	150	500M	0.2	500M	50	E	300K	T
2N2671	G	P			AH	0.1W	A	75	25		0	40	1.0M							
2N2672	G	P			AH	0.1W	A	90	25		0	40	1.0M							
2N2672A	G	P			AH	0.1W	A	90	32	32	S	40	1.0M							
2N2673	S	N	2N2222A	2N2218	A	250M	A	200	60	45	0	8.0	22	1.0M	1.5	5.0M	9.0	E	2.5M	B
2N2674	S	N	2N2222A	2N2218	A	250M	A	200	60	45	0	12	40	1.0M	1.5	5.0M	18	E	5.0M	B
2N2675	S	N	2N2222A	2N2218	A	250M	A	200	60	45	0	22	76	1.0M	1.5	5.0M	37	E	10M	B
2N2676	S	N	2N2222A	2N2218	A	250M	A	200	60	45	0	45	290	1.0M	1.5	5.0M	76	E	10M	B
2N2677	S	N	2N2221A	2N2218	A	250M	A	200	45	35	0	20	55	1.0M	1.5	5.0M	19	E	10M	B
2N2678	S	N	2N2221A	2N2218	A	250M	A	200	45	35	0	45	150	1.0M	1.5	5.0M	39	E	20M	B
2N2679	Thyristors, see Table on Page 2-70																			
2N2690	thru																			
2N2691	G	P			SP	100W	C	110	100	80	0	30	100	20A	0.65	20A			6.0M	T
2N2691A	G	P			SP	170W	C	125	120	80	0	50	100	20M						
2N2692	S	N	2N929	2N929	SH	300M	A	175	45	30	0	90	360	100*	0.12	100*			42M	T
2N2693	S	N	2N929	2N929	SH	300M	A	175	45	30	0	40	10*	0.12	100*			42M	T	
2N2694	S	N	2N929	2N929	SH	300M	A	175	45	20	0	20	10*	0.12	100*			42M	T	
2N2695	S	P			S	360M	A	200	25	25	0	30	130	50M	0.25	50M	25	E	100M	T
2N2696	S	P		2N2696	S	360M	A	200	25	25	0	30	130	50M	0.25	50M	25	E	100M	T
2N2697	S	N	2N5478	2N5471	SP	18W	C	200	80	60	0	40	120	1.0A	0.5	1.0A			20M	T
2N2698	S	N	2N5478	2N5471	SP	18W	C	200	100	80	0	40	120	1.0A	0.5	1.0A			20M	T
2N2699	G	P	2N964	2N960	SH	150M	A	100	15	8.0	0	40	200	10M	0.18	10M			300M	T
2N2700	G	P			A	0.5W	A	75	32	32	S	65	120	20M			80	E	1.3M	B
2N2701	G	N,P	Matched Pair, 2N2430 (NPN) and 2N2706 (PNP)																	
2N2702	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2703	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2704	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2705	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2706	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2707	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2708	S	N			AH	200M	A	200	35	20	0	30	200	2.0M			30	E		
2N2709	S	N	2N2800	2N2800	A	240M	A	160	50	35	0	10	22	0.2M	0.4	8.0M			200K	B
2N2710	S	N		2N2710	SH	360M	A	200	40	20	0	40	90	1.0M	0.25	10M			5	



2N2718-2N2804

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)					Units	Units
2N2718	G	P	2N3440		SH	240M	A	100	20	12	0	25	170M	0.27	170M			150M	T	
2N2719	S	N			SH	300M	A	175	25	8.0	0	30	60M	0.40	60M			200M	T	
2N2720	S	N		2N2720	AM	0.3W	A	200	80	60	0	30	120	0.1M	1.0	10M	30	E	80M	T
2N2721	S	N		2N2720	AM	0.3W	A	200	80	60	0	30	120	0.1M	1.0	10M	30	E	80M	T
2N2722	S	N		2N2722	AM	0.3W	A	200	45	45	0	50	250	1.0*	1.0	10M	100	E	100M	T
2N2723	S	N		2N2723	AL	0.5W	A	200	80	60	0	2K	10K	10M	1.0	10M	1500	E	100M	T
2N2724	S	N		2N2723	AL	0.5W	A	200	80	60	0	7K	50K	10M	1.0	10M	5000	E	100M	T
2N2725	S	N		2N2723	AL	0.5W	A	200	45	45	0	2K	10K	0.1M	1.0	10M	1500	E	100M	T
2N2726	S	N			AHP	1.0W	A	200	200	200	R	30	90	0.2A	2.0	0.2A	30	E	15M	T
2N2727	S	N			AHP	1.0W	A	200	200	200	R	75	150	0.2A	2.0	0.2A	75	E	15M	T
2N2728	G	P	2N2728		SH	170W	C	110	15	5.0	0	40	130	20A	0.1	50A			3.0K	T
2N2729	S	N			SH	300M	A	200	30	15	0	20	200	3.0M	0.4	10M			600M	T
2N2730	G	P	MP506	MP500	SP	170W	C	110	80	60	0	30	120	25A	0.25	25A			200K	T
2N2731	G	P	MP505	MP500	SP	170W	C	110	60	45	0	30	120	25A	0.25	25A			200K	T
2N2732	G	P	MP504	MP500	SP	170W	C	110	40	30	0	30	120	25A	0.25	25A			200K	T
2N2733	G	P	MP506	MP500	SP	140W	C	110	80	60	0	30	120	25A	0.25	25A			200K	T
2N2734	G	P	MP505	MP500	SP	140W	C	110	60	45	0	30	120	25A	0.25	25A			200K	T
2N2735	G	P	MP504	MP500	SP	140W	C	110	40	30	0	30	120	25A	0.25	25A			200K	T
2N2736	G	P	MP506	MP500	SP	140W	C	110	80	60	0	30	120	25A	0.25	25A			200K	T
2N2737	G	P	MP505	MP500	SP	140W	C	110	60	45	0	30	120	25A	0.25	25A			200K	T
2N2738	G	P	MP504	MP500	SP	140W	C	110	40	30	0	30	120	25A	0.25	25A			200K	T
2N2739	S	N	2N5885	2N5883	SP	200W	C	175	50	50	V	10	10A	1.5	10A					
2N2740	S	N	2N5629	2N5629	SP	200W	C	175	100	100	V	10	10A	1.5	10A					
2N2741	S	N	2N5631	2N5629	SP	200W	C	175	150	150	V	10	10A	1.5	10A					
2N2742	S	N	2N5885 2N5886	2N5883 2N5883	SP	200W	C	175	200	200	V	10	10A	1.5	10A					
2N2743	S	N			SP	200W	C	175	250	250	V	10	10A	1.5	10A					
2N2744	S	N			SP	200W	C	175	300	300	V	10	10A	1.5	10A					
2N2745	S	N			SP	200W	C	175	50	50	V	10	15A	1.5	15A					
2N2746	S	N			SP	200W	C	175	100	100	V	10	15A	1.5	15A					
2N2747	S	N			SP	200W	C	175	150	150	V	10	15A	1.5	15A					
2N2748	S	N			SP	200W	C	175	200	200	V	10	15A	1.5	15A					
2N2749	S	N			SP	200W	C	175	250	250	V	10	15A	1.5	15A					
2N2750	S	N			SP	200W	C	175	300	300	V	10	15A	1.5	15A					
2N2751	S	N	2N5685	2N5685	SP	200W	C	175	50	50	V	10	20A	1.5	20A					
2N2752	S	N	2N5686	2N5685	SP	200W	C	175	100	100	V	10	20A	1.5	20A					
2N2753	S	N			SP	200W	C	175	150	150	V	10	20A	1.5	20A					
2N2754	S	N			SP	200W	C	175	200	200	V	10	20A	1.5	20A					
2N2755	S	N			SP	200W	C	175	250	250	V	10	20A	1.5	20A					
2N2756	S	N			SP	200W	C	175	300	300	V	10	20A	1.5	20A					
2N2757	S	N			SP	200W	C	175	50	50	V	10	10A	1.5	10A					
2N2758	S	N			SP	200W	C	175	100	100	V	10	10A	1.5	10A					
2N2759	S	N			SP	200W	C	175	150	150	V	10	10A	1.5	10A					
2N2760	S	N			SP	200W	C	175	200	200	V	10	10A	1.5	10A					
2N2761	S	N			SP	200W	C	175	250	250	V	10	10A	1.5	70A					
2N2762	S	N			SP	200W	C	175	300	300	V	10	10A	1.5	10A					
2N2763	S	N			SP	200W	C	175	50	50	V	10	15A	1.5	15A					
2N2764	S	N			SP	200W	C	175	100	100	V	10	15A	1.5	15A					
2N2765	S	N			SP	200W	C	175	150	150	V	10	15A	1.5	15A					
2N2766	S	N			SP	200W	C	175	200	200	V	10	15A	1.5	15A					
2N2767	S	N			SP	200W	C	175	250	250	V	10	15A	1.5	15A					
2N2768	S	N			SP	200W	C	175	300	300	V	10	15A	1.5	15A					
2N2769	S	N			SP	200W	C	175	50	50	V	10	20A	1.5	20A					
2N2770	S	N			SP	200W	C	175	100	100	V	10	20A	1.5	20A					
2N2771	S	N			SP	200W	C	175	150	150	V	10	20A	1.5	20A					
2N2772	S	N			SP	200W	C	175	200	200	V	10	20A	1.5	20A					
2N2773	S	N			SP	200W	C	175	250	250	V	10	20A	1.5	20A					
2N2774	S	N			SP	200W	C	175	300	300	V	10	20A	1.5	20A					
2N2775	S	N			SP	200W	C	175	50	50	V	10	25A	1.5	25A					
2N2776	S	N			SP	200W	C	175	100	100	V	10	25A	1.5	25A					
2N2777	S	N			SP	200W	C	175	150	150	V	10	25A	1.5	25A					
2N2778	S	N	2N2785	2N2785	SP	200W	C	175	200	200	V	10	25A	1.5	25A					
2N2779	S	N			SP	200W	C	175	250	250	V	10	25A	1.5	25A					
2N2780	S	N			SP	200W	C	175	300	300	V	10	25A	1.5	25A					
2N2781	S	N			AHP	200W	C	175	75	30	7.5	75	0.35A	5.0	1.0A				75M	T
2N2782	S	N			AHP	200W	C	175	100	40	7.5	75	0.35A	5.0	1.0A				75M	T
2N2783	S	N			AHP	200W	C	175	100	40	7.5	75	0.35A	5.0	1.0A				75M	T
2N2784	S	N			SH	300M	A	200	15	6.0	0	20	100*	0.26	3.0M	600	E		1.0G	T
2N2785	S	N			AL	500M	A	175	60	40	0	2K	20K	0.1A	1.0	15M				
2N2786	G	P			AH	1.5W	C	90	35	20	0	33	200	0.1A						
2N2786A	G	P			AH	1.5W	C	90	35	20	0	33	200	0.1A						
2N2787	S	N	2N2218	2N2218	SH	800M	A	175	75	35	0	20	50	150M	0.4	150M	15	E	250M	T
2N2788	S	N	2N2218A	2N2218	SH	800M	A	175	75	35	0	40	120	150M	0.4	150M	30	E	250M	T
2N2789	S	N	2N2219A	2N2218	SH	800M	A	175	75	35	0	100	300	150M	0.4	150M	80	E	250M	T
2N2790	S	N	2N2218	2N2218	SH	500M	A	175	75	35	0	20	60	150M	0.4	150M	15	E	250M	T
2N2791	S	N	2N2221A	2N2218	SH	500M	A	175	75	35	0	40	120	150M	0.4	150M	30	E	250E	T
2N2792	S	N	2N2222A	2N2218	SH	500M	A	175	75	35	0	100	300	150M	0.4	150M	80	E	250E	T
2N2793	G	P			AHP	170W	C	110	75	60	0	50	100	15A	0.45	50A	20	E	2.0K	E
2N2794	Field-Effect Transistors, see Table on Page 2-81																			
2N2795	G	P			SH	75M	A	100	25	15	0	50	50M	0.125	50M			300M	T	
2N2796	G	P			SH	75M	A	100	20	12	0	30	50M	0.25	50M			300M	T	
2N2797	G	P			SH	75M	A	100	40	20	0	40	50M	0.2	50M			150M	T	
2N2798	G	P			SH	75M	A	100	60	25	0	20	50M	0.25	50M			120M	T	
2N2799	G	P			SH	75M	A	100	30	15	0	20	50M	0.25	50M			120M	T	
2N2800	S	P	2N2800	2N2800	SH	0.8W	A	200	50	35	0	30	90	150M	0.4	150M			120M	T
2N2801	S	P			SH	0.8W	A	200	50	35	0	75	225	150M	0.4	150M			120M	T
2N2802	S	P			AM	250M	A													



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript	
2N2805	S	P			AM	250M	A	200	25	20	0	40	120	100*	0.5	10M	40	E	60M	T
2N2806	S	P			AM	250M	A	200	25	20	0	40	120	100*	0.5	10M	40	E	60M	T
2N2807	S	P			AP	250M	A	200	25	20	0	40	120	100*	0.5	10M	40	E	60M	T
2N2808	S	N			AH	300M	A	200	30	10	0	20	120	2.0M	0.25	4.0M	20	E	1.0G	T
2N2808A	S	N			AH	200M	A	200	30	10	0	20	120	2.0M	0.25	4.0M	7.0	E	1.5G	T
2N2809	S	N			AH	200M	A	200	30	15	0	20	120	2.0M	0.25	4.0M	20	E	600M	T
2N2809A	S	N			AH	200M	A	200	30	15	0	20	120	2.0M	0.25	4.0M	20	E	1.0G	T
2N2810	S	N			AH	200M	A	200	24	10	0	20	120	2.0M	0.25	4.0M	20	E	600M	T
2N2810A	S	N			AH	200M	A	200	24	10	0	20	120	2.0M	0.25	4.0M	20	E	1.0G	T
2N2811	S	N	2N5477	2N5477	AP	70W	J	200	80	60	0	20	60	5.0A	0.5	5.0A	20	E	15M	T
2N2812	S	N	2N5478	2N5477	AP	70W	J	200	80	60	0	40	120	5.0A	0.5	5.0A	40	E	15M	T
2N2813	S	N	2N5477	2N5477	AP	70W	J	200	120	80	0	20	60	5.0A	0.5	5.0A	20	E	15M	T
2N2814	S	N	2N5478	2N5477	AP	70W	J	200	120	80	0	40	120	5.0A	0.5	5.0A	40	E	15M	T
2N2815	S	N	MJ7000	MJ7000	SP	200W	C	200	80	80	0	10	50	1.0A	1.5	1.0A			0.6M	T
2N2816	S	N	MJ7000	MJ7000	SP	200W	C	200	100	100	0	10	50	1.0A	1.5	1.0A			0.6M	T
2N2817	S	N			SP	200W	C	200	150	150	0	10	50	1.0A	1.5	1.0A			0.6M	T
2N2818	S	N			SP	200W	C	200	200	200	0	10	50	1.0A	1.5	1.0A			0.6M	T
2N2819	S	N	MJ7000	MJ7000	SP	200W	C	200	80	80	0	10	50	1.5A	1.5	1.5A			0.6M	T
2N2820	S	N	MJ7000	MJ7000	SP	200W	C	200	100	100	0	10	50	1.5A	1.5	1.5A			0.6M	T
2N2821	S	N			SP	200W	C	200	150	150	0	10	50	1.5A	1.5	1.5A			0.6M	T
2N2822	S	N			SP	200W	C	200	200	200	0	10	50	1.5A	1.5	1.5A			0.6M	T
2N2823	S	N	MJ7000	MJ7000	SP	200W	C	200	80	80	0	10	40	2.0A	1.1	2.0A			0.6M	T
2N2824	S	N	MJ7000	MJ7000	SP	200W	C	200	100	100	0	10	40	2.0A	1.1	2.0A			0.6M	T
2N2825	S	N			SP	200W	C	200	150	150	0	10	40	2.0A	1.1	2.0A			0.6M	T
2N2826	G	P			AP	4.5W	C	95		15	0	75	200	100M	1.0	500M				
2N2827	G	P			AP	4.5W	C	95		30	0	75	200	100M	1.0	500M				
2N2828	S	N			SP	4.0W	C	200	80	60	0	20	60	0.5A	0.4	0.5A			1.0M	T
2N2829	S	N	2N5477	2N5477	SP	4.0W	C	200	80	60	0	20	60	1.0A	0.3	1.0A			1.0M	T
2N2831	S	N	2N2221	2N2218	AH	360M	A	200	40	12	0	25		1.0M	0.25	1.0M	40	E	250M	T
2N2832	G	P			SP	85W	C	110	80	50	0	25	100	1.0A	0.5	2.0A			10M	T
2N2833	G	P			SP	85W	C	110	120	75	0	25	100	1.0A	0.5	2.0A			10M	T
2N2834	G	P			SP	85W	C	110	140	100	0	25	100	1.0A	0.5	2.0A				
2N2835	G	P			A	16W	C	90	32	32	R	30	100	1.0A	0.4	1.0A			0.3M	B
2N2836	G	P	2N3612	2N3611	AP	37.5W	C	100	55	55	R	30	100						250K	B
2N2837	S	P			SH	0.5W	A	200	50	35	0	30	90	150M	0.4	150M			120M	T
2N2838	S	P			SH	0.5W	A	200	50	35	0	75	225	150M	0.4	150M			120M	T
2N2840	Unijunction Transistors, see Table on Page 2-88																			
2N2841	Field-Effect Transistors, see Table on Page 2-81																			
2N2844																				
2N2845	S	N		2N2845	S	360M	A	200	60	30	0	30	120	150M	0.4	150M			250M	T
2N2846	S	N		2N2845	S	800M	A	200	60	30	0	30	120	150M	0.4	150M			250M	T
2N2847	S	N		2N2845	S	360M	A	200	60	20	0	40	140	150M	0.4	150M			250M	T
2N2848	S	N		2N2845	S	800M	A	200	60	20	0	40	140	150M	0.4	150M			250M	T
2N2849	S	N	2N5337	2N5336	SH	850M	A	200	100	80	0	100	300	1.0A	0.4	1.0A			30M	T
2N2850	S	N	2N5336	2N5336	SH	850M	A	200	100	80	0	40	120	1.0A	0.25	1.0A			30M	T
2N2851	S	N	2N5336	2N5336	SH	850M	A	200	100	80	0	40	120	1.0A	0.4	1.0A			30M	T
2N2852	S	N	2N5335	2N5334	SH	850M	A	200	100	80	0	20	60	1.0A	0.4	1.0A			30M	T
2N2853	S	N	2N5336	2N5336	SH	850M	A	200	60	40	0	40		1.0A	1.5	5.0A			30M	T
2N2854	S	N	2N5337	2N5336	SH	850M	A	200	60	40	0	100	300	1.0A	0.4	1.0A			30M	T
2N2855	S	N	2N5336	2N5336	SH	850M	A	200	60	40	0	40	120	1.0A	0.4	1.0A			30M	T
2N2856	S	N	2N5334	2N5334	SH	850M	A	200	60	40	0	20	60	1.0A	0.4	1.0A			30M	T
2N2857	S	N	2N2857	2N2857	AH	200M	A	200	30	15	0	30	150	3.0M			50	E	1.0G	T
2N2858	S	N	2N5335	2N5334	SP	0.6W	C	200	100	80	0	20	60	1.0A	0.3	1.0A			1.0M	T
2N2859	S	N	2N5338	2N5336	SP	0.6W	C	200	120	100	0	20	60	1.0A	0.3	1.0A			1.0M	T
2N2860	G	P			SH	150M	A	100	18	7.0	0	40		40M	0.4	36M			250M	T
2N2861	S	P	2N3798	2N3798	A	300M	A	200	25	20	0	30	120	10*	0.2	10M	50	E	60M	T
2N2862	S	P	2N3798	2N3798	A	300M	A	200	25	20	0	12	120	10*	0.2	10M	25	E	45M	T
2N2863	S	N	2N2219	2N2218	AH	800M	A	200	60	25	0	30	200	200M	1.0	500M			150M	T
2N2864	S	N	2N2219	2N2218	AH	800M	A	200	60	25	0	20	200	200M	1.0	500M			150M	T
2N2865	S	N			AH	200M	A	200	25	13	0	20	200	4.0M	0.4	10M	20	E	600M	T
2N2866	S	N	2N5477	2N5477	AHP	40W	C	175	120	80	0	20	60	0.5A	0.75	1.0A			10M	T
2N2867	S	N	2N5478	2N5477	AHP	40W	C	175	120	80	0	40	120	0.5A	0.75	1.0A			10M	T
2N2868	S	N	2N3252	2N3252	SH	0.8W	A	200	60	40	0	40	120	0.15A	0.25	0.15A			50M	T
2N2869	G	P	MP2015		AP	30W	C	100	60	50	0	50	165	1.0A	0.75	1.0A			200K	T
2N2870	G	P	MP2016		AP	30W	C	100	80	50	0	50	165	1.0A	0.5	1.0A			200K	T
2N2871	S	P			SC	0.4W	A	200	60	60	0	15		1.0M					0.2M	T
2N2872	S	P			SC	0.4W	A	200	110	110	0	15		1.0M					0.2M	T
2N2873	G	N			AH	115M	A	100	35	35	V	40		1.0M			40	E	300M	T
2N2874	S	P			AHP	2.0W	C	175	75	40	0	7.5	75	0.35A	5.0	1.0A			140M	T
2N2875	S	N	2N6182	2N6182	AHP	2.0W	C	200	60	50	0	15	60	1.5A	1.5	0.5A	20	E	25M	T
2N2876	S	N			AH	17.5W	C	200	80	60	0	5.0		2.5A	1.0	2.5A			150M	T
2N2877	S	N	2N5477	2N5477	AHP	53W	C	200	80	60	0	20	60	1.0A	0.25	1.0A	20	E	30M	T
2N2878	S	N	2N5478	2N5477	AHP	53W	C	200	80	60	0	40	120	1.0A	0.25	1.0A	40	E	50M	T
2N2879	S	N	2N5477	2N5477	AHP	53W	C	200	100	80	0	20	60	1.0A	0.25	1.0A	20	E	30M	T
2N																				



2N2893-2N2967

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript	f <sub>T</sub>	Subscript				
						@ 25°C	°C	(volts)	(volts)									(min)	(max)	Units	Units
2N2893	S	N	2N5478	2N5477	SP	30W	C 200	100	80	0	50	150	1.0A	0.5	1.0A	50	E	30M	T		
2N2894	S	P		2N2894	SP	360M	A 200	12	12	0	40	150	30M	0.15	10M			400M	T		
2N2894A	S	P	MM2894A	MM2894A	SP	360M	A 200	12	12	S	40		30M					800M	T		
2N2895	S	N		2N2895	S	500M	A 200	120	65	0	40	120	150M	0.6	150M	50	E	120M	T		
2N2896	S	N		2N2895	S	500M	A 200	140	90	0	60	200	150M	0.6	150M	50	E	120M	T		
2N2897	S	N		2N2895	S	500M	A 200	60	45	0	50	200	150M	1.0	150M	50	E	120M	T		
2N2898	S	N			S	500M	A 200	120	65	0	40	120	150M	0.6	150M	50	E	120M	T		
2N2899	S	N			S	500M	A 200	140	90	0	60	200	150M	0.6	150M	50	E	120M	T		
2N2900	S	N			S	500M	A 200	60	45	0	50	200	150M	1.0	150M	50	E	120M	T		
2N2901	S	N			SC	0.36W	A 200	20	10	0	30		10M	0.15	10M			300M	T		
2N2902	S	N	2N5430	2N5427	AP	40W	C 200	120	120	0	30	90	500M	7.5	500M	30	E	2.0M	T		
2N2903	S	N		2N2903	AM	600M	C 200	60	30	0	125	625	1.0M	1.0	5.0M	150	E	60M	T		
2N2903A	S	N		2N2903	AM	600M	C 200	60	30	0	125	625	1.0M	1.0	5.0M	150	E	60M	T		
2N2904	S	P		2N2904	SH	3.0W	C 200	60	40	0	40	120	150M	0.4	150M			200M	T		
2N2904A	S	P		2N2904	SH	3.0W	C 200	60	40	0	40	120	150M	0.4	150M			200M	T		
2N2905	S	P		2N2904	SH	3.0W	C 200	60	40	0	100	300	150M	0.4	150M			200M	T		
2N2905A	S	P		2N2904	SH	3.0W	C 200	60	40	0	100	300	150M	0.4	150M			200M	T		
2N2906	S	P		2N2904	SH	1.8W	C 200	60	40	0	40	120	150M	0.4	150M			200M	T		
2N2906A	S	P		2N2904	SH	1.8W	C 200	60	40	0	40	120	150M	0.4	150M			200M	T		
2N2907	S	P		2N2904	SH	1.8W	C 200	60	40	0	100	300	150M	0.4	150M			200M	T		
2N2907A	S	P		2N2904	SH	1.8W	C 200	60	40	0	100	300	150M	0.4	150M			200M	T		
2N2908	S	N	2N5069	2N5067	AP	75W	C 200	80	80	R	12	60	1.0A	10	1.0A	10	E	1.0M	T		
2N2909	S	N	2N2221A	2N2218	SH	0.4W	A 200	60	40	0	40	120	0.15A	0.25	0.15A			50M	T		
2N2910	S	N	2N3409	2N3409	AM	0.3W	A 200	45	25	0	70		0.1M	1.0	10M	50	E	11M	T		
2N2911	S	N	2N3766	2N3766	AP	5.0W	C 200	150	125	0	20	60	1.0A	0.3	1.0A			1.0M	T		
2N2912	G	P		2N2912	SP	75W	C 110	15	6.0	0	75		10A	0.5	25A			20M	T		
2N2913	S	N		2N2913	AM	300M	A 200	45	45	0	60	240	10*	0.35	1.0M			60M	T		
2N2914	S	N		2N2913	AM	300M	A 200	45	45	0	150	600	10*	0.35	1.0M			60M	T		
2N2915	S	N		2N2213	AM	300M	A 200	45	45	0	60	240	10*	0.35	1.0M			60M	T		
2N2915A	S	N		A	300M	A 200	45	45	0							240	E	60M	T		
2N2916	S	N		2N2913	AM	300M	A 200	45	45	0	150	600	10*	0.35	1.0M			60M	T		
2N2916A	S	N		A	300M	A 200	45	45	0							600	E	60M	T		
2N2917	S	N		2N2913	AM	0.3W	A 200	45	45	0	60	240	10*	0.35	1.0M			60M	T		
2N2918	S	N		2N2913	AM	0.3W	A 200	45	45	0	150	600	10*	0.35	1.0M			60M	T		
2N2919	S	N		2N2913	AM	0.3W	A 200	60	60	0	60	240	10*	0.35	1.0M			60M	T		
2N2919A	S	N		A	300M	A 200	60	60	0							240	E	60M	T		
2N2920	S	N		2N2913	AM	0.3W	A 200	60	60	0	150	600	10*	0.35	1.0M			60M	T		
2N2920A	S	N		A	300M	A 200	60	60	0							600	E	60M	T		
2N2921	S	N		A	0.2W	A 125	25	25	0							35	E				
2N2922	S	N	MPS6512	MPS6512	A	0.2W	A 125	25	25	0						55	E				
2N2923	S	N	MPS2923	MPS2923	A	0.2W	A 125	25	25	0						90	E				
2N2924	S	N	MPS2924	MPS2923	A	0.2W	A 125	25	25	0						150	E				
2N2925	S	N	MPS2925	MPS2923	A	0.2W	A 125	25	25	0						235	E				
2N2926	S	N	MPS2926	MPS2926	A	0.2W	A 125	18	18	0						35	E				
2N2927	S	P		2N2926	S	800M	A 200	25	25	0	30	130	50M	0.25	50M	25	E	100M	T		
2N2928	G	P		AH	150M	A 100	15	13	0	0.8	200	2.0M				0.10	E	400M	T		
2N2929	G	P		AH	750M	C 100	25	10	0	10	100	10M	0.5	50M	10	E	800M	T			
2N2930	G	P	2N3427	2N3427	S	250M	A 100	30	12	0	60	420	10M	0.25	100M			4.0M	T		
2N2931	S	N		A	50M	A 125	5.0	5.0	0	50		50M	0.45	50M	30	E	20M	T			
2N2932	S	N		A	50M	A 125	5.0	5.0	0	70		50M	0.45	50M	70	E	20M	T			
2N2933	S	N		A	50M	A 125	5.0	5.0	0	50		50M	0.45	50M	45	E	20M	T			
2N2934	S	N		A	50M	A 125	45	30	0	50		50M	0.45	50M	30	E	20M	T			
2N2935	S	N		A	50M	A 125	45	30	0	70		50M	0.45	50M	70	E	20M	T			
2N2936	S	N	2N930A	2N929	A	300M	A 175	60	55	0	100	300	10*	0.3	2.0M	150	E	30M	T		
2N2937	S	N	2N930A	2N929	A	300M	A 175	60	55	0	100	300	10*	0.3	2.0M	150	E	30M	T		
2N2938	S	N	2N2369A	2N2369A	SH	300M	A 200	25	13	0	30		50M	0.4	50M			500M	T		
2N2939	S	N	2N2193	2N2192	AHP	0.8W	A 300	75	60	0	60	240	0.15A	0.75	0.15A			150M	T		
2N2940	S	N	2N3019	2N3019	AHP	0.8W	A 300	120	80	0	60	240	0.15A	0.75	0.15A			150M	T		
2N2941	S	N	2N3501	2N3498	AHP	0.8W	A 200	150	100	0	60	240	0.15A	0.75	0.15A			150M	T		
2N2942	G	P		SH	150M	A 100	50	25	0	50			10M	0.15	10M			150M	T		
2N2943	G	P		SH	150M	A 100	30	15	0	30			10M	0.2	10M			120M	T		
2N2944	S	P		2N2944	SC	400M	A 175	15	10	0	80		1.0M					10M	T		
2N2944A	S	P		2N2944	SC	400M	A 200	15	10	0	100		1.0M					15M	T		
2N2945	S	P		2N2944	SC	400M	A 175	25	20	0	40		1.0M					5.0M	T		
2N2945A	S	P		2N2944	SC	400M	A 200	25	20	0	100		1.0M					10M	T		
2N2946	S	P		2N2944	SC	400M	A 175	40	35	0	30		1.0M					3.0M	T		
2N2946A	S	P		2N2944	SC	400M	A 200	40	35	0	50		1.0M					5.0M	T		
2N2947	S	N		2N2947	AP	25W	C 175	60	60	S	2.5	55	0.4A	0.5	1.0A			100M	T		
2N2948	S	N		2N2947	AP	25W	C 175	40	40	S	2.5	100	0.4A	0.5	1.0A			100M	T		
2N2949	S	N		2N2949	AP	6.0W	C 175	60	60	S	5.0	100	40M	0.5	0.4A			100M	T		
2N2950	S	N		2N2949	AP	6.0W	C 175	60	60	S	5.0	100	40M	0.5	0.4A			100M	T		
2N2951	S	N		2N2951	AP	3.0W	C 175	60	60	S	20	150	10M	0.5	0.15A			200M	T		
2N2952	S	N		2N2951	AP	1.8W	C 175	60	60	S	20	150	10M	0.5	0.15A			200M	T		
2N2953	G	P	2N1194	2N1191	A	120M	A 100	30	25	R	100		50M			200	E	300M	T		
2N2954	S	N	2N834	2N834	SH	200M	A 200	30	20	0	25	300	2.0M			25	E	300M	T		
2N2955	G	P		2N2955	SH	0.15W	A 100	40	40		20	60	50M	0.2	1						



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE—</sub>	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript				
						@ 25°C	°C	(volts)	(volts)	(min)							(max)	Units	Units	Units
2N2968	S	P	2N3250	2N3250	S	150M	A	140	30	10	0	15	100*	0.6	10M			8.0M	T	
2N2969	S	P	2N3250	2N3250	S	150M	A	140	30	10	0	15	100*	0.6	10M			8.0M	T	
2N2970	S	P	2N3250	2N3250	S	150M	A	140	30	20	0	10	100*	0.8	10M			4.0M	T	
2N2971	S	P	2N3250	2N3250	S	150M	A	140	30	20	0	10	100*	0.8	10M			4.0M	T	
2N2972	S	N		2N2913	AM	0.25W	A	200	45	45	0	60	240	10*	0.35	1.0M			60M	T
2N2973	S	N		2N2913	AM	0.25W	A	200	45	45	0	150	600	10*	0.35	1.0M			60M	T
2N2974	S	N		2N2913	AM	0.25W	A	200	45	45	0	60	240	10*	0.35	1.0M			60M	T
2N2975	S	N		2N2913	AM	0.25W	A	200	45	45	0	150	600	10*	0.35	1.0M			60M	T
2N2976	S	N		2N2913	AM	250M	A	200	45	45	0	60	240	10*	0.35	1.0M			60M	T
2N2977	S	N		2N2913	AM	250M	A	200	45	45	0	150	600	10*	0.35	1.0M			60M	T
2N2978	S	N		2N2913	AM	250M	A	200	60	60	0	60	240	10*	0.35	1.0M			60M	T
2N2979	S	N		2N2913	AM	0.25W	A	200	60	60	0	150	600	10*	0.35	1.0M			60M	T
2N2980	S	N	2N2060A	2N2060	AM	0.25W	A	200	100	60	0	25	75	10*	1.2	50M	50	E	60M	T
2N2981	S	N	2N2223	2N2060	AM	0.25W	A	200	100	60	0	50	200	10M	1.2	50M	40	E	50M	T
2N2982	S	N	2N2223A	2N2060	AM	0.25W	A	200	100	60	0	50	200	10M	1.2	50M	40	E	50M	T
2N2983	S	N	2N5335	2N5334	AP	1.0W	A	175	155	80	20	60	500M	0.6	1.0A	20	E	60M	T	
2N2984	S	N	2N5682	2N5681	AP	1.0W	A	175	185	120	0	20	60	500M	0.8	200M	20	E	60M	T
2N2985	S	N	2N5338	2N5336	AP	1.0W	A	175	155	80	40	120	500M	0.8	200M	40	E	60M	T	
2N2986	S	N			AP	1.0W	A	175	185	120	0	40	120	500M	0.8	200M	40	E	60M	T
2N2987	S	N	2N5335	2N5334	AP	1.0W	A	200	95	80	25	75	200M	0.8	200M	25	E	30M	T	
2N2988	S	N	2N5681	2N5681	AP	1.0W	A	200	155	100	25	75	200M	0.8	200M	25	E	30M	T	
2N2989	S	N	2N5337	2N5336	AP	1.0W	A	200	95	80	60	120	200M	0.8	200M	50	E	30M	T	
2N2990	S	N	2N5339	2N5336	AP	1.0W	A	200	155	100	0	60	120	200M	0.8	200M	50	E	30M	T
2N2991	S	N	2N5447	2N5447	AP	2.0W	A	200	95	80	25	75	200M	0.8	200M	25	E	30M	T	
2N2992	S	N	2N5479	2N5477	AP	2.0W	A	200	155	100	0	20		1.0M	0.8	200M	25	E	30M	T
2N2993	S	N	2N5478	2N5477	AP	2.0W	A	200	95	80	60	120	200M	0.8	200M	50	E	30M	T	
2N2994	S	N	2N5480	2N5477	AP	2.0W	A	200	155	100	0	60	120	200M	0.8	200M	50	E	30M	T
2N2995	S	N		AHP	1.5W	A	175	120	100	0	25	90	0.2A	1.7	0.2A	30	E	10M	T	
2N2996	G	P		AH	75M	A	100	15	10	25	500	4.0M				35	E	400M	T	
2N2997	G	P		AH	75M	A	100	30	15	40	500	4.0M				50	E	400M	T	
2N2998	G	P		AH	75M	A	100	15	12	15	300	3.0M				20	E	600M	T	
2N2999	G	P	2N3283	2N3283	AH	75M	A	100	15	10	0	10		3.0M		15	E	1.4G	T	
2N3001 thru 2N3008	Thyristors, see Table on Page 2-70																			
2N3009	S	N		2N3009	SH	360M	A	200	40	15	0	30	120	30M	0.18	30M			350M	T
2N3010	S	N		2N3010	SH	300M	A	200	15	6.0	0	25	125	10M	0.25	10M			600M	T
2N3011	S	N		2N3011	SH	360M	A	200	30	12	0	30	120	10M	0.2	10M			400M	T
2N3013	S	N		2N3009	SH	360M	A	200	40	15	0	30	120	30M	0.18	30M			350M	T
2N3014	S	N		2N3009	SH	360M	A	200	40	20	0	30	120	30M	0.18	10M			250M	T
2N3015	S	N		2N3015	SH	800M	A	200	60	30	0	30	120	150M	0.4	150M			200M	T
2N3016	S	N		AHP	3.33W	C	150	100	50	0	60	150	1.0A	0.75	1.0A			200M	T	
2N3017	S	N		AHP	3.33W	C	150	100	50	0	60	150	1.0A	0.75	5.0A			200M	T	
2N3018	S	N		AHP	25W	C	150	100	50	0	60	150	1.0A	0.75	5.0A			200M	T	
2N3019	S	N		2N3019	AH	0.8W	A	200	140	80	0	100	300	0.15A	0.2	0.15A	80	E	100M	T
2N3020	S	N		2N3019	AH	0.8W	A	200	140	80	0	40	120	0.15A	0.2	0.15A	30	E	80M	T
2N3021	S	P		2N3021	SHP	25W	C	175	30	30	0	20	60	1.0A	1.5	3.0A			60M	T
2N3022	S	P		2N3021	SHP	25W	C	175	45	45	0	20	60	1.0A	1.5	3.0A			60M	T
2N3023	S	P		2N3021	SHP	25W	C	175	30	30	0	50	180	1.0A	1.0	3.0A			60M	T
2N3024	S	P		2N3021	SHP	25W	C	175	45	45	0	50	180	1.0A	1.0	3.0A			60M	T
2N3025	S	P		2N3021	SHP	25W	C	175	60	60	0	50	180	1.0A	1.0	3.0A			60M	T
2N3026 thru 2N3032	Thyristors, see Table on Page 2-70																			
2N3033	S	N		AL	300M	A	175	100	100	R				1.0	100M					
2N3034	S	N		AL	300M	A	175	70	70	R				1.0	100M					
2N3035	S	N		AL	300M	A	175	50	50	R				1.0	100M					
2N3036	S	N		A	800M	A	200	120	80	0	50	150	150M	0.25	150M	40	E	50M	T	
2N3037	S	N	2N3036	2N3036	A	360M	A	175	120	70	0	40	120	150M	0.2	10M	30	E	50M	T
2N3038	S	N			A	360M	A	175	100	60	0	80	240	150M	0.2	10M	60	E	50M	T
2N3039	S	P			A	360M	A	175	50	35	0	20	80	150M			20	E	50M	T
2N3040	S	P			A	360M	A	175	40	30	0	40	160	150M	0.2	10M	40	E	50M	T
2N3043	S	N		2N3043	AM	250M	A	200	45	45	0	100	300	10*	1.0	10M	130	E	30M	T
2N3044	S	N		2N3043	AM	250M	A	200	45	45	0	100	300	10*	1.0	10M	130	E	30M	T
2N3045	S	N		2N3043	A	250M	A	200	45	45	0	100	300	10*	1.0	10M	130	E	30M	T
2N3046	S	N		2N3043	AM	250M	A	200	45	45	0	50	200	10*	1.0	10M	65	E	30M	T
2N3047	S	N		2N3043	AM	250M	A	200	45	45	0	50	200	10*	1.0	10M	65	E	30M	T
2N3048	S	N		2N3043	A	250M	A	200	45	45	0	50	200	10*	1.0	10M	65	E	30M	T
2N3049	S	P		MD3250AF	AM	250M	A	200	25	20	0	20	120	10*	0.2	10M	30	E	60M	T
2N3050	S	P		MD3250AF	AM	250M	A	200	25	20	0	20	120	10*	0.2	10M	30	E	60M	T
2N3051	S	P		MD3250AF	A	250M	A	175	25	20	0	20	120	10*	0.2	10M	30	E	60M	T
2N3052	S	N			A	250M	A	175	35	15	0	25	130	10M	0.25	10M			200M	T
2N3053	S	N		2N3053	SH	5.0W	C	200	60	40	0	50	250	0.15A	1.4	0.15A			100M	T
2N3053A	S	N			SP	5.0W	C	200	80	60	0	50	250	150M	0.3	150M	25	E	100M	T
2N3054	S	N	2N3054A	2N3054	AP	25W	C	200	90	60	R	25	100	0.5A	1.0	0.5A	25	E	30K	E
2N3054A	S	N	2N3054A		AP	75W	C	200	90	60	R	25	100	0.5A	1.0	0.5A	25	E	30K	E
2N3055	S	N		2N3055	AP	115W	C	200	100	70	R	20	70	4.0A	1.1	4.0A	15	E	20K	E
2N3056	S	N			AH	0.4W	A	200	100	60	0	40	120	0.15A	0.25	0.15A	30	E	80M	T
2N3056A	S	N			AH	0.4W	A	200	140	80	0	40	120	0.15A	0.2	0.15A	30	E	80M	T
2N3057	S	N			AH	0.4W														



## 2N3065-2N3173

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units						(volts)	Units
2N3065 2N3066, A thru 2N3071	S	P			A	400M	A	200	110	100	0	30	90	1.0M			30	E		
Field-Effect Transistors, see Table on Page 2-81																				
2N3072	S	P		2N3072	S	800M	A	200	60	60	0	30	130	50M	0.25	50M	25	E	130M	T
2N3073	S	P		2N3072	S	360M	A	200	60	60	0	30	130	50M	0.25	50M	25	E	130M	T
2N3074	G	P			AH	0.14W	A	85	30	25	S	25	300	3.5M						
2N3075	G	P			AH	0.14W	A	85	35	25	S	20	250	3.0M						
2N3076	S	N	MJ7000	MJ7000	SH	125W	C	175	140	50	0	30	90	7.0A	1.0	10A	60	E	50M	T
2N3077	S	N			A	0.36W	A	200	80	60	0	100	400	10*0.35	1.0M	120	E	15M	T	
2N3078	S	N			A	0.36W	A	200	80	60	0	40	120	10*0.35	1.0M	50	E	15M	T	
2N3079	S	N	2N5241	2N5241	SP	178W	C	150	200	200	0	7.0	40	5.0A	0.7	5.0A			30K	E
2N3080	S	N	2N5241	2N5241	SP	178W	C	150	300	300	0	7.0	40	5.0A	0.7	5.0A			30K	E
2N3081	S	P	2N2193	2N2192	SH	600M	A	200	70	50	0	20		500M	0.3	150M			150M	T
2N3082	S	N			SC	0.5W	A	200	25	7.0	0	100		0.25M					100M	T
2N3083	S	N			SC	0.5W	A	200	25	7.0	0	100		0.25M					100M	T
2N3084	Field-Effect Transistors, see Table on Page 2-81																			
2N3089, A thru 2N3091	Thyristors, see Table on Page 2-70																			
2N3106	S	N			S	0.8W	A	200	100	60	0	100	300	0.15A	1.0	1.0A	60	E	70M	T
2N3107	S	N			S	800M	A	200	100	60	0	40	120	150M	0.25	150M			60M	T
2N3108	S	N			S	800M	A	200	80	40	0	100	300	0.15A	1.0	1.0A	60	E	70M	T
2N3109	S	N	2N2193	2N2193	S	800M	A	200	80	40	0	40	120	150M	0.25	150M			60M	T
2N3112	Field-Effect Transistors, see Table on Page 2-81																			
2N3113	S	N			AH	800M	A	200	150	150	0	30	120	30M	1.0	50M	25	E	40M	T
2N3114	S	N			SH	0.4W	A	200	60	20	0	40	120	0.15A	0.5	0.15A			250M	T
2N3115	S	N			SH	0.4W	A	200	60	20	0	100	300	0.15A	0.5	0.15A			250M	T
2N3116	S	N			A	360M	A	200	60	60	0	250	500	10*0.35	1.0M	400	E	60M	T	
2N3117	S	N	2N930A	2N929	AH	1.0W	A	200	85	60	0	50	275	25M					250M	T
2N3118	S	N			SH	1.0W	A	200	100	80	0	50	200	100M	0.5	100M			250M	T
2N3119	S	P	2N3501	2N3498	SH	800M	A	200	45	45	0	30	130	50M	0.25	50M	25	E	130M	T
2N3120	S	P			S	360M	A	200	45	45	0	30	130	50M	0.25	50M	25	E	130M	T
2N3121	S	P			S	360M	A	200	45	45	0	30	130	50M	0.25	50M	25	E	130M	T
2N3122	S	N	2N2219A	2N2218	A	800M	A	200	50	30	0	25	100	300M	1.5	300M			60M	T
2N3123	S	N	2N2219A	2N2218	SH	0.8W	A	175	60	30	0	100	300	0.15A	0.4	0.15A			400M	T
2N3124	G	P			AP	90W	C	100	40	30	S	50	100	10A	0.5	10A	20	E	2.5K	E
2N3125	G	P			AP	90W	C	100	80	80	S	30	75	3.0A	1.5	3.0A	10	E	5.0K	E
2N3126	G	P			AP	90W	C	100	100	75	S	10	30	10A	1.0	10A	10	E	6.0K	E
2N3127	G	P			AH	0.1W	A	100	30	20	0	20	75	3.0M	0.3	5.0M	20	E	400M	T
2N3128	S	N			A	0.15W	A	150	20	20	0	50	150	0.1M	0.25	1.0M	75	E	60M	T
2N3129	S	N			A	0.15W	A	150	45	45	0	100	300	10N	0.25	1.0M	160	E	60M	T
2N3130	S	N			A	0.15W	A	150	60	60	0	60	180	10N	0.25	1.0M	110	E	60M	T
2N3131	S	N			SH	0.15W	A	150	40	15	0	30	120	10M	0.25	10M			250M	T
2N3132	G	P			SP	90W	C	100	100	70	S	40	200	2.0A	1.5	5.0A			3.0K	E
2N3133	S	P			SH	0.6W	A	200	50	35	0	40	120	0.15A	0.6	0.15A			200M	T
2N3134	S	P			SH	0.6W	A	200	50	35	0	100	300	0.15A	0.6	0.15A			200M	T
2N3135	S	P			SH	0.4W	A	200	50	35	0	40	120	0.15A	0.6	0.15A			200M	T
2N3136	S	P			SH	0.4W	A	200	50	35	0	100	300	0.15A	0.6	0.15A			200M	T
2N3137	S	N			AH	600M	A	200	40	20	0				0.3	50M			500M	T
2N3138	S	N	2N5477	2N5477	AHP	20W	C	200	65	65	0	10		1.0A					100M	T
2N3139	S	N			AHP	20W	C	200	140	140	0	10		1.0A					100M	T
2N3140	S	N	2N5477	2N5477	AHP	20W	C	200	65	65	0	10		1.0A					100M	T
2N3141	S	N			AHP	20W	C	200	140	140	0	10		1.0A					100M	T
2N3142	S	N	2N5477	2N5477	AHP	25W	C	200	65	65	0	10		1.0A					100M	T
2N3143	S	N			AHP	25W	C	200	140	140	0	10		1.0A					100M	T
2N3144	S	N	2N5477	2N5477	AHP	25W	C	200	65	65	0	10		1.0A					100M	T
2N3145	S	N			AHP	25W	C	200	140	140	0	10		1.0A					100M	T
2N3146	G	P	2N3616	2N3615	AP	150W	C	100	150	140	V	30	90	5.0A	0.4	5.0A	20	E	200K	T
2N3147	G	P	2N3616	2N3615	AP	150W	C	100	180	160	V	30	90	5.0A	0.4	5.0A	20	E	200K	T
2N3148	G	P			S	0.45M	A	100	11	6.0	0	70		20M	0.2	50M	80	E	25M	T
2N3149	S	N			SP	300W	C	200	80	80	0	10		50A	1.5	50A			0.1M	T
2N3150	S	N			SP	300W	C	200	100	100	0	10		50A	1.5	50A			0.1M	T
2N3151	S	N			SP	300W	C	200	150	150	0	10		50A	1.5	50A			0.1M	T
2N3152	S	N			SH	25M	C	200	120	120	0	40		30M			20	E	200M	T
2N3153	S	N			SC	0.3W	A	200	15	15	0								30M	T
2N3154	G	P			SP	37.5W	C	100	40	25	0	60	180	0.5A	1.1	3.0A			15K	E
2N3155	G	P			SP	37.5W	C	100	60	40	0	60	180	0.5A	1.1	3.0A			15K	E
2N3156	G	P			SP	37.5W	C	100	80	55	0	60	180	0.5A	1.1	3.0A			15K	E
2N3157	G	P			SP	37.5W	C	100	100	65	0	60	180	0.5A	1.1	3.0A			15K	E
2N3158	G	P			SP	37.5W	C	100	40	25	0	30	75	0.5A	1.4	3.0A			10K	E
2N3159	G	P			SP	37.5W	C	100	60	40	0	30	75	0.5A	1.4	3.0A			10K	E
2N3160	G	P			SP	37.5W	C	100	80	55	0	30	75	0.5A	1.4	3.0A			10K	E
2N3161	G	P			SP	37.5W	C	100	100	65	0	30	75	0.5A	1.4	3.0A			10K	E
2N3162	S	N	2N3411	2N3409	AM	300M	A	200	45	25	0	50	200	10M	0.5	10M			300M	T
2N3163	S	P			AHP	85W	C	200	40	40	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T
2N3164	S	P			AHP	85W	C	200	60	60	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T
2N3165	S	P			AHP	85W	C	200	80	80	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T
2N3166	S	P			AHP	85W	C	200	100	100	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T
2N3167	S	P	2N4901	2N4901	AHP	85W	C	200	40	40	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T
2N3168	S	P	2N4902	2N4901	AHP	85W	C	200	60											



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE—</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE—</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units						(volts)	Units
2N3174	S	P	2N6182	2N6182	AHP	75W	C	200	100	100	0	12	36	1.0A	0.75	1.0A	10	E	1.0M	T
2N3175	S	P	2N6182	2N6182	AHP	85W	C	200	40	40	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3176	S	P	2N6182	2N6182	AHP	85W	C	200	60	60	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3177	S	P	2N6182	2N6182	AHP	85W	C	200	80	80	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3178	S	P	2N6184	2N6182	AHP	85W	C	200	100	100	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3179	S	P	2N4901	2N4901	AHP	85W	C	200	40	40	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3180	S	P	2N4902	2N4901	AHP	85W	C	200	60	60	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3181	S	P	2N4903	2N4901	AHP	85W	C	200	80	80	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3182	S	P	2N6226		AHP	85W	C	200	100	100	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3183	S	P	2N3183		AHP	75W	C	200	40	40	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3184	S	P	2N3184		AHP	75W	C	200	60	60	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3185	S	P	2N3185		AHP	75W	C	200	80	80	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3186	S	P	2N6226		AHP	75W	C	200	100	100	0	10	30	2.0A	1.0	2.0A	10	E	1.0M	T
2N3187	S	P	2N6182	2N6182	AHP	85W	C	200	40	40	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3188	S	P	2N6182	2N6182	AHP	85W	C	200	60	60	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3189	S	P	2N6182	2N6182	AHP	85W	C	200	80	80	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3190	S	P	2N6184	2N6182	AHP	85W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3191	S	P	2N4901	2N4901	AHP	85W	C	200	40	40	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3192	S	P	2N4902	2N4901	AHP	85W	C	200	60	60	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3193	S	P	2N4903	2N4901	AHP	85W	C	200	80	80	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3194	S	P	2N6226	2N6226	AHP	85W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3195	S	P	2N3195		AHP	75W	C	200	40	40	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3196	S	P	2N3196		AHP	75W	C	200	60	60	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3197	S	P	2N3197		AHP	75W	C	200	80	80	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3198	S	P	2N3198		AHP	75W	C	200	100	100	0	10	30	3.0A	0.9	3.0A	10	E	1.0M	T
2N3199	S	P	2N6192	2N6190	AHP	40W	C	200	40	40	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T
2N3200	S	P	2N6192	2N6190	AHP	40W	C	200	60	60	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T
2N3201	S	P	2N6192	2N6190	AHP	40W	C	200	80	80	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T
2N3202	S	P	2N3202		AHP	8.8W	C	200	40	40	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T
2N3203	S	P	2N3203		AHP	8.8W	C	200	60	60	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T
2N3204	S	P	2N3204		AHP	8.8W	C	200	80	80	0	20	60	1.0A	0.3	1.0A	10	E	1.0M	T
2N3205	S	P	2N6182	2N6182	AHP	40W	C	200	40	40	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T
2N3206	S	P	2N6182	2N6182	AHP	40W	C	200	60	60	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T
2N3207	S	P	2N3207		AHP	40W	C	200	100	100	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T
2N3208	S	P	2N3208		AHP	8.8W	C	200	40	40	0	20	60	0.5A	0.4	0.5A	10	E	1.0M	T
2N3209	S	P	2N3209		S	0.36W	A	200	20	20	0	30	120	30M	0.2	30M			400M	T
2N3210	S	N		2N3210	SH	0.36W	A	200	40	15	0	30	120	10M	0.75	0.2A			300M	T
2N3211	S	N		2N3211	SH	0.36W	A	200	40	15	0	50	150	10M	0.2	10M			350M	T
2N3212	G	P			AP	14W	C	110	100	80	0	30	90	3.0A	0.5	5.0A	3.0	E		
2N3213	G	P			AP	14W	C	110	80	60	0	30	90	3.0A	0.5	5.0A	3.0	E		
2N3214	G	P			AP	14W	C	110	60	40	0	30	90	3.0A	0.5	5.0A	3.0	E		
2N3215	G	P			AP	14W	C	110	40	30	0	25	100	3.0A	0.5	5.0A	3.0	E		
2N3216	G	P			S	150M	A	100	20	10	0	60	200M		0.22	200M			10M	T
2N3217	S	P	2N2944	2N2944	SC	400M	A	200	15	10	0								1.0M	T
2N3218	S	P	2N2945	2N2944	SC	400M	A	200	25	20	0								1.0M	T
2N3219	S	P	2N2945	2N2944	SC	400M	A	200	40	35	0								1.0M	T
2N3220	S	N	2N5477	2N5477	AHP	6.0W	C	175	100	80	0	20	60	1.0A	1.25	1.0A	20	E	10M	T
2N3221	S	N	2N5477	2N5477	AHP	6.0W	C	175	100	80	0	40	120	1.0A	1.25	1.0A	40	E	10M	T
2N3222	S	N	2N5477	2N5477	AHP	6.0W	C	175	80	60	0	20	60	1.0A	1.25	1.0A	20	E	10M	T
2N3223	S	N	2N5479	2N5477	AHP	6.0W	C	175	80	60	0	40	120	1.0A	1.25	1.0A	40	E	10M	T
2N3224	S	P	2N3498	2N3498	AH	0.7W	A	200	100	100	0	20	60	50M			20	E	60M	T
2N3225	S	P	2N3498	2N3498	AH	0.7W	A	200	100	100	0	40	120	50M			40	E	80M	T
2N3226	S	N	2N5873	2N5871	AP	75W	C	200	35	35	0	20	50	2.0A	1.2	2.7A	20	E	30K	E
2N3227	S	N	2N3269	SH	0.36W	A	200	40	20	0	100	300	10M	0.25	10M			500M	T	
2N3228	Thyristors, see Table on Page 2-70																			
2N3229	S	N			AHP	17.5W	C	200	105	60	0	5.0	2.5A	1.0	2.5A			150M	T	
2N3230	S	N			SHP	25W	C	200	80	60	0	2K	20K	2.0A	1.4	2.0A			40M	T
2N3231	S	N			SHP	25W	C	200	100	80	0	2K	20K	2.0A	1.4	2.0A			40M	T
2N3232	S	N			AHP	117W	C	200	80	60	0	18	150	3.0A	2.5	3.0A	10	E	20K	E
2N3233	S	N	2N3233		AHP	117W	C	200	110	100	0	18	150	3.0A	2.5	3.0A	10	E	20K	E
2N3234	S	N	2N5760		AHP	117W	C	200	160	160	0	18	150	3.0A	2.5	3.0A	10	E	20K	E
2N3235	S	N	2N3235	2N3232	AHP	117W	C	200	65	55	0	20	70	4.0A	1.1	4.0A	10	E	1.0M	E
2N3236	S	N	2N3236		AHP	150W	C	200	90	90	0	17	60	5.0A	1.1	5.0A	10	E	1.0M	E
2N3237	S	N	2N3237		AHP	200W	C	200	90	75	0	12	36	10A	2.0	10A	10	E	1.0M	E
2N3238	S	N	2N3239		AHP	150W	C	200	80	80	0	8.5	25	10A	3.0	10A	10	E	1.0M	E
2N3239	S	N	2N5882	2N5879	AHP	150W	C	200	80	80	0	8.5	25	10A	1.0	10A	10	E	1.0M	E
2N3240	S	N	2N5631	2N5629	AHP	150W	C	200	160	160	0	8.5	25	10A	1.0	10A	10	E	1.0M	E
2N3241	S	N	2N2219	2N2218	A	0.5W	A	175	30	25	0	50	300	10M			70	E	50M	T
2N3241A	S	N			A	500M	A	175	30	25	0						175	E	100M	T
2N3242	S	N			A	0.5W	A	175	30	25	0	75		10M			100	E	50M	T
2N3242A	S	N			A	500M	A	175	40	40	0						200	E	100M	T
2N3244	S	P		2N3244	SH	1.0W	A	200	40	40										



2N3262-2N3371

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript		
2N3262	S	N			SH	8.75W	C	200	100	80	0	40	0.5A	0.6	1.0A			150M	T		
2N3263	S	N			SP	75W	C	200	150	90	0	20	15A	1.0	20A			20M	T		
2N3264	S	N			SP	75W	C	200	120	60	0	20	80	1.6	20A			20M	T		
2N3265	S	N			SP	125W	C	200	150	90	0	20	55	1.5A	1.0	20A			20M	T	
2N3266	S	N			SP	125W	C	200	120	60	0	20	80	1.5A	1.6	20A			20M	T	
2N3267	G	P			AH	75M	A	100	15	8.0	0	10	500	3.0M			900M	T			
2N3268	S	N			A	0.15W	A	200	45	45	0	12	80	1.0	5.0M	15	E	2.5M	T	B	
2N3269 thru 2N3276	Thyristors, see Table on Page 2-70																				
2N3277 2N3278	Field-Effect Transistors, see Table on Page 2-81																				
2N3279	G	P			2N3279	AH	0.1W	A	100	30	20	0	10	70	3.0M	0.3	5.0M	10	E	400M	T
2N3280	G	P			2N3279	AH	0.1W	A	100	30	20	0	10	70	3.0M	0.3	5.0M	10	E	400M	T
2N3281	G	P			2N3279	AH	0.1W	A	100	30	15	0	10	100	3.0M	0.5	5.0M	10	E	300M	T
2N3282	G	P			2N3283	AH	0.1W	A	100	30	15	0	10	100	3.0M	0.5	5.0M	10	E	300M	T
2N3283	G	P			2N3283	AH	0.1W	A	100	25	25	0	10	100	3.0M			10	E	250M	T
2N3284	G	P			2N3283	AH	0.1W	A	100	25	25	0	10	100	3.0M			10	E	250M	T
2N3285	G	P			2N3283	AH	0.1W	A	100	20	20	0	15	100	3.0M			5.0	E	250M	T
2N3286	G	P			2N3283	AH	0.1W	A	100	20	20	0	15	100	3.0M			5.0	E	250M	T
2N3287	S	N			2N3287	AH	0.2W	A	200	40	20	0	15	100	2.0M	0.3	5.0M	15	E	350M	T
2N3288	S	N			2N3287	AH	0.2W	A	200	40	20	0	15	100	2.0M	0.3	5.0M	15	E	350M	T
2N3289	S	N			2N3287	AH	0.2W	A	200	30	15	0	10	150	2.0M	0.4	5.0M	10	E	300M	T
2N3290	S	N			2N3287	AH	0.2W	A	200	30	15	0	10	150	2.0M	0.4	5.0M	10	E	300M	T
2N3291	S	N			2N3291	AH	0.2W	A	200	25	25	0	10	100	2.0M			10	E	250M	T
2N3292	S	N			2N3291	AH	0.2W	A	200	25	25	0	10	100	2.0M			10	E	250M	T
2N3293	S	N			2N3291	AH	0.2W	A	200	20	20	0	10	100	2.0M			10	E	250M	T
2N3294	S	N			2N3291	AH	0.2W	A	200	20	20	0	10	100	2.0M			10	E	250M	T
2N3295	S	N			2N3295	AHP	800M	A	175	60	60	0	20	60	10M	0.5	0.15A	200M	T		
2N3296	S	N			2N3296	AHP	700M	A	175	60	60	0	50	50	40M	0.5	0.4A	100M	T		
2N3297	S	N			2N3297	AHP	25W	C	175	60	60	0	60	60	0.4A	0.5	1.0A	200M	T		
2N3298	S	N			2N3298	AHP	1.0W	C	175	25	15	0	80	240	10M			200M	T		
2N3299	S	N			2N3299	SH	0.8W	A	200	60	30	0	40	120	0.15A	0.22	0.15A	250M	T		
2N3300	S	N			2N3299	SH	0.8W	A	200	60	30	0	100	300	0.15A	0.22	0.15A	250M	T		
2N3301	S	N			2N3299	SH	0.36W	A	200	60	30	0	40	120	0.15A	0.22	0.15A	250M	T		
2N3302	S	N			2N3299	SH	0.36W	A	200	60	30	0	100	300	0.15A	0.22	0.15A	250M	T		
2N3303	S	N			2N3303	SH	0.6W	A	200	25	12	0	30	120	0.3A	0.33	0.3A	450M	T		
2N3304	S	N			2N3304	S	0.3W	A	200	6.0	6.0	0	30	120	0.16	0.16	10M	40	E	20M	T
2N3305	S	P			2N3305	A	0.6W	A	200	50	40	0	40	120	0.1M	0.2	10M	70	E	20M	T
2N3306	S	P			2N3306	A	0.6W	A	200	50	40	0	100	300	0.1M	0.2	10M	70	E	20M	T
2N3307	S	P			2N3307	AH	0.2W	A	200	40	35	0	40	250	2.0M	0.4	3.0M	40	E	300M	T
2N3308	S	P			2N3307	AH	0.2W	A	200	30	25	0	25	250	2.0M	0.4	3.0M	25	E	300M	T
2N3309	S	N	2N3553		2N3375	AHP	3.5W	C	175	50	50	0	50	100	30M	0.5	0.25A	300M	T		
2N3309A	S	N	2N3553		2N3375	AHP	5.0W	C	200	60	60	0	80	80	50M	0.5	0.25A	300M	T		
2N3310	S	N			2N3310	AHP	0.3W	A	200	35	15	0	10	200	2.0M	0.5	2.0M	300M	T		
2N3311	G	P			2N3311	AP	170W	C	110	30	30	0	60	120	3.0A	0.1	3.0A	30	E	1.0K	E
2N3312	G	P			2N3311	AP	170W	C	110	45	45	0	60	120	3.0A	0.1	3.0A	30	E	1.0K	E
2N3313	G	P			2N3311	AP	170W	C	110	60	60	0	60	120	3.0A	0.1	3.0A	30	E	1.0K	E
2N3314	G	P			2N3311	AP	170W	C	110	30	30	0	100	200	3.0A	0.1	3.0A	40	E	1.0K	E
2N3315	G	P			2N3311	AP	170W	C	110	45	45	0	100	200	3.0A	0.1	3.0A	40	E	1.0K	E
2N3316	G	P			2N3311	AP	170W	C	110	60	60	0	100	200	3.0A	0.1	3.0A	40	E	1.0K	E
2N3317	S	P			2N3317	SC	0.15W	A	140	30	30	0	40	120	3.0A	0.1	3.0A	40	E	1.0K	E
2N3318	S	P			2N3318	SC	0.15W	A	140	15	15	0	40	120	3.0A	0.1	3.0A	40	E	1.0K	E
2N3319	S	P			2N3319	SC	0.15W	A	140	10	10	0	40	120	3.0A	0.1	3.0A	40	E	1.0K	E
2N3320	G	P			2N3320	SH	60M	A	100	15	10	0	50	100	20M	0.19	40M	600M	T		
2N3321	G	P			2N3321	SH	60M	A	100	12	7.0	0	100	100	10M	0.12	10M	600M	T		
2N3322	G	P			2N3322	SH	60M	A	100	12	7.0	0	100	100	10M	0.12	10M	600M	T		
2N3323	G	P			2N3323	AH	0.15W	A	100	35	35	0	30	200	3.0M			30	E	200M	T
2N3324	G	P			2N3323	AH	0.15W	A	100	35	35	0	30	200	3.0M			30	E	200M	T
2N3325	G	P			2N3323	AH	0.15W	A	100	35	35	0	30	200	3.0M			30	E	200M	T
2N3326	S	N	2N2218A		2N2218	SH	0.8W	A	175	60	45	0	40	120	0.15A	0.4	0.15A	250M	T		
2N3327	S	N			2N3327	AHP	20W	C	200	65	65	0	10	100	0.5A			100M	T		
2N3328	Field-Effect Transistors, see Table on Page 2-81																				
2N3336	Thyristors, see Table on Page 2-70																				
2N3337	S	N	2N3287		2N3287	AH	0.3W	A	200	40	40	0	30	300	4.0M			30	E	400M	T
2N3338	S	N	2N3289		2N3287	AH	0.3W	A	200	40	40	0	30	300	4.0M			30	E	400M	T
2N3339	S	N	2N3288		2N3287	AH	0.3W	A	200	40	40	0	30	300	4.0M			30	E	400M	T
2N3340	S	N			S	0.4W	A	175	30	20	0	40	10*		10*			70M	T		
2N3341	S	P			S	0.4W	A	175	30	20	0	40	10*		10*			50M	T		
2N3342	S	P			S	0.25W	A	175	20	8.0	0	30	5.0M		5.0M			2.0M	T		
2N3343	S	P			SC	0.25W	A	175	25	8.0	0	20	0.25M		0.25M			2.0M	T		
2N3344	S	P			SC	0.25W	A	175	30	30	0	25	1.0M		1.0M			2.0M	T		
2N3345	S	P			SC	0.25W	A	175	50	50	0	15	1.0M		1.0M			2.0M	T		
2N3346	S	P			SC	0.25W	A	175	50	50	0	25	1.0M		1.0M			2.0M	T		
2N3347	S	P			AM	300M	A	175	60	45	0	40	300	10*	0.5	10M	60	E	60M	T	
2N3348	S	P			AM	300M	A	175	60	45	0	40	300	10*	0.5	10M	60	E	60M	T	
2N3349	S	P			AM	300M	A	175	60	45	0	40	300	10*	0.5	10M	60	E	60M	T	
2N3350	S	P			AM	300M	A	175	60	45	0	100	300	10*	0.5	10M	150	E	60M	T	
2N3351	S	P			AM	300M	A	175	60	45	0	100	300	10*	0.5	10M	150	E	60M	T	
2N3352	S	P			AM	300M	A	175	60	45	0	100	300	10*	0.5	10M	150	E	60M	T	
2N3353	Th																				



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript				
						@ 25°C	°C	(volts)	(volts)	(min)							(max)	Units	(volts)	Units
2N3374	S	N	2N3500	2N3498	AHP	5.0W	C	200	80	80	0	10		0.17A	0.3	0.15A		230M	T	
2N3375	S	N		2N3375	AHP	11.6W	C	200	65	40	0	10	100	0.25A	1.0	0.25A		400M	T	
2N3376 thru 2N3387	Field-Effect Transistors, see Table on Page 2-81																			
2N3388	S	N			S	0.6W	A	175	125	100	0	60		2.5M	1.0	2.5M		36M	T	
2N3389	S	N			S	0.6W	A	175	195	160	0	60		7.0M	1.0	7.0M		36M	T	
2N3390	S	N	MPS6521	MPS6512	A	0.2W	A	125	25	25	0	400	800	2.0M			400	E	E	
2N3391	S	N	MPS6515	MPS6512	A	0.2W	A	125	25	25	0	250	500	2.0M			250	E	E	
2N3391A	S	N	MPS6520	MPS6512	A	0.2W	A	125	25	25	0	250	500	2.0M			250	E	E	
2N3392	S	N	MPS3392	MPS3392	A	0.2W	A	125	25	25	0	150	300	2.0M			150	E	E	
2N3393	S	N	MPS3393	MPS3392	A	0.2W	A	125	25	25	0	90	180	2.0M			90	E	E	
2N3394	S	N	MPS3394	MPS3392	A	0.2W	A	125	25	25	0	55	110	2.0M			55	E	E	
2N3395	S	N	MPS3395	MPS3392	A	0.2W	A	125	25	25	0	150	500	2.0M			150	E	E	
2N3396	S	N	MPS3396		A	0.2W	A	125	25	25	0	90	500	2.0M			90	E	E	
2N3397	S	N	MPS3397		A	0.2W	A	125	25	25	0	55	500	2.0M			55	E	E	
2N3398	S	N	MPS3398		A	0.2W	A	125	25	25	0	55	800	2.0M			55	E	E	
2N3399	G	P		AH	80M	A	100	20	20	0	10		1.5M				400M	T		
2N3400	G	P		SH	0.15W	A	100	20	20	0	50	300	10M	0.15	10M	4.0	150M	T		
2N3401	S	P		SC	0.25W	A	150	25	25	0			5.0M				0.1M	B		
2N3402	S	N	MPS6513	MPS6512	A	0.56W	A	150	25	25	0	75	225	2.0M	0.3	50M	75	E	E	
2N3403	S	N	MPS6515	MPS6512	A	0.56W	A	150	25	25	0	180	540	2.0M	0.3	50M	180	E	E	
2N3404	S	N		A	0.56W	A	150	50	50	0	75	225	2.0M	0.3	50M	75	E	E		
2N3405	S	N		A	0.56W	A	150	50	50	0	180	540	2.0M	0.3	50M	100	E	E		
2N3406 thru 2N3407	Unijunction Transistors, see Table on Page 2-88																			
2N3408	S	N		AH	0.2W	A	200	35	18	0	10	100	10M			10	E	300M	T	
2N3409	S	P		AH	4.0W	A	200	40	25	0	10	100	40M			10	E	200M	T	
2N3410	S	N	MD3409	MD3409	AM	0.5W	A	200	60	30	0	30	120	0.1M	0.15	10M		250M	T	
2N3411	S	N	MD3409	MD3409	AM	0.5W	A	200	60	30	0	20	100	10M	0.15	10M		250M	T	
2N3412	S	N		AM	0.5W	A	200	60	30	0	20	100	10M	0.15	10M		250M	T		
2N3413	G	P		A	60M	A	100	20	20	0	30	200	10M	0.2	10M	25	E	100M	T	
2N3414	S	N	MPS6513	MPS6512	A	0.36W	A	160	25	25	0	75	225	2.0M	0.3	50M	75	E	0.23M	T
2N3415	S	N	MPS6515	MPS6512	A	0.36W	A	160	25	25	0	180	540	2.0M	0.3	50M	180	E	E	
2N3416	S	N	MPS6515	MPS6512	A	0.36W	A	160	50	50	0	75	225	2.0M	0.3	50M	75	E	E	
2N3417	S	N	MPS6515	MPS6512	A	0.36W	A	160	50	50	0	180	540	2.0M	0.3	50M	100	E	E	
2N3418	S	N	2N5334	2N5334	SP	0.8W	A	175	85	60	0	20	60	1.0A	0.25	1.0A		40M	T	
2N3419	S	N	2N5335	2N5334	SP	0.8W	A	175	125	80	0	20	60	1.0A	0.25	1.0A		40M	T	
2N3420	S	N	2N5336	2N5336	SP	0.8W	A	175	85	60	0	40	120	1.0A	0.25	1.0A		40M	T	
2N3421	S	N	2N5336	2N5336	SP	0.8W	A	175	125	80	0	40	120	1.0A	0.25	1.0A		40M	T	
2N3422 thru 2N3423	Thyristors, see Table on Page 2-70																			
2N3424	S	N		AM	0.3W	A	200	30	15	0	20	200	3.0M	0.4	10M		600M	T		
2N3425	S	N	2N3425	AHP	0.3W	A	200	40	15	0	20	200	3.0M	0.4	10M		600M	T		
2N3426	S	N		SH	0.6W	A	200	25	12	0	30	120	0.3A	0.33	0.3A	20	E	300M	T	
2N3427	G	P		A	0.2W	A	100	45	30	R	100	350	0.1A	0.2	0.1A	200	E	450M	T	
2N3428	G	P		A	0.2W	A	100	45	30	R	150	400	0.1A	0.19	0.1A	350	E	4.0M	T	
2N3429	S	N	2N5877	2N5875	SP	150W	C	175	50	50	0	10	35	5.0A	1.0	5.0A		5.0M	T	
2N3430	S	N	2N5632	2N5632	SP	150W	C	175	100	100	0	10	35	5.0A	1.0	5.0A		20K	E	
2N3431	S	N	2N5634	2N5632	SP	150W	C	175	150	150	0	10	35	5.0A	1.0	5.0A		20K	E	
2N3432	S	N		SP	150W	C	175	200	200	0	10	35	5.0A	1.0	5.0A		20K	E		
2N3433	S	N		SP	150W	C	175	250	250	0	10	35	5.0A	1.0	5.0A		20K	E		
2N3434	S	N		SP	150W	C	175	300	300	0	10	35	5.0A	1.0	5.0A					
2N3435	S	N		AHP	1.0W	A	200	80	60	0	50	200	10M				140M	T		
2N3436 thru 2N3438	Field-Effect Transistors, see Table on Page 2-81																			
2N3439	S	N	2N3439	2N3439	AH	1.0W	A	200	450	350	0	40	160	20M			25	E	15M	T
2N3440	S	N	2N3440	2N3439	AH	1.0W	A	200	300	250	0	40	160	20M			25	E	15M	T
2N3441	S	N	2N3441		AP	25W	C	200	160	140	0	20	80	0.5A	6.0	2.7A	15	E	0.2M	T
2N3442	S	N	2N3442		AP	100W	C	200	160	140	0	20	70	3.0A	5.0	10A	12	E	80K	T
2N3443	G	P		AH	0.3W	A	100	20	15	0	20	150	10M				20	E	750M	T
2N3444	S	N		SH	1.0W	A	200	80	50	0	20	60	0.5A	0.35	0.15A		150M	T		
2N3445	S	N	2N3445	2N3445	AP	115W	C	200	80	60	0	20	60	3.0A	1.5	3.0A	20	E	10M	T
2N3446	S	N	2N3446	2N3445	AP	115W	C	200	100	80	0	20	60	3.0A	1.5	3.0A	20	E	10M	T
2N3447	S	N	2N3447	2N3445	AP	115W	C	200	80	60	0	40	120	5.0A	1.5	5.0A	40	E	10M	T
2N3448	S	N	2N3448	2N3445	AP	115W	C	200	100	80	0	40	120	5.0A	1.5	5.0A	40	E	10M	T
2N3449	G	P		SH	150M	A	100	15	6.0	0	20		10M	0.2	2.0M		300M	T		
2N3450	S	N		SH	0.6W	A	200	120	60	0	40	120	0.15A	0.5	0.15A		100M	T		
2N3451	S	P		SH	0.3W	A	200	6.0	6.0	0	30	120	10M	0.16	10M		500M	T		
2N3452 thru 2N3460	Field-Effect Transistors, see Table on Page 2-81																			
2N3461	G	P		AP	5.0W	C	110	60	30	0	90	150	0.5A	0.4	1.0A	40	E	10K	E	
2N3462	S	N		A	0.3W	A	200	50	35	0	100	300	10*	0.35	5.0M	150	E	10M	T	
2N3463	S	N		A	0.3W	A	200	60	45	0	120	360	10*	0.35	1.0M	150	E	45M	T	
2N3464	S	N	2N5334		AHP	5.0W	C	200	60	40	0	35	100	0.2A	1.0	0.2A	30	E	50M	T
2N3465 thru 2N3466	Field-Effect Transistors, see Table on Page 2-81																			
2N3467	S	P		SH	1.0W	A	200	40	40	0	40	120	0.5A	0.3	0.15A		175M	T		
2N3468	S	P		SH	1.0W	A	200	50	50	0	25	75	0.5A	0.35	0.15A		150M	T		
2N3469	S	N	2N5337	2N5336	AHP	1.25W	A	200	35	25	0	100	350	0.5A	0.5	1.0A	100	E	20M	T
2N3470	S	N	2N6057		AP	150W	C	150	50	50	0	100	500	9.0A	3.5	9.0A	50	E	7.0K	E
2N3471	S	N	2N6059		AP	150W	C	150	100	100	0	100	500	9.0A	3.5	9.0A	50	E	7.0K	E
2N3472	S	N		AP	150W	C	150	150	150	0	100	500	9.0A	3.5	9.0A	50	E	7.0K	E	
2N3473	S	N		AP	150W	C	150	200	200	0	100	500	9.0A	3.5	9.0A	50	E	7.0K	E	
2N3474	S	N	2N6055		AP	150W	C	150	50	50	0	700	10K	4.0A	3.5	9.0A	100	E	4.0K	E
2N3475	S	N		AP	150W	C	150	100	100	0	700	10K	4.0A	3.5	9.0A	100	E	4.0K	E	



## 2N3476-2N3581

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>f</sub> —	Subscript	f <sub>—</sub>	Subscript	
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	Units					Units
2N3476	S	N			AP	150W	C	150	150	150	0	700	10K	4.0A	3.5	9.0A	100	E	4.0K	E
2N3477	S	N			AP	150W	C	150	200	200	0	700	10K	4.0A	3.5	9.0A	100	E	4.0K	E
2N3478	S	N			AH	0.2W	A	200	30	15	0	25	150	2.0M			25	E	750M	E
2N3479 thru 2N3484	Unijunction Transistors, see Table on Page 2-88																			
2N3485	S	P		2N2904	SH	2.0W	C	200	60	40	0	40	120	0.15A	0.4	0.15A			200M	T
2N3485A	S	P		2N2904	SH	2.0W	C	200	60	40	0	40	120	0.15A	0.4	0.15A			200M	T
2N3486	S	P		2N2904	SH	2.0W	C	200	60	40	0	100	300	0.15A	0.4	0.15A			200M	T
2N3486A	S	P		2N2904	SH	2.0W	C	200	60	40	0	100	300	0.15A	0.4	0.15A			200M	T
2N3487	S	N	2N3487	2N3487	AP	115W	C	200	80	60	0	20	60	3.0A	0.3	1.0A	20	E	10M	T
2N3488	S	N	2N3488	2N3487	AP	115W	C	200	100	80	0	20	60	3.0A	0.3	1.0A	20	E	10M	T
2N3489	S	N	2N3489	2N3487	AP	115W	C	200	120	100	0	15	45	3.0A	0.3	1.0A	20	E	10M	T
2N3490	S	N	2N3490	2N3487	AP	115W	C	200	80	60	0	40	120	5.0A	0.3	1.0A	40	E	10M	T
2N3491	S	N	2N3491	2N3487	AP	115W	C	200	100	80	0	40	120	5.0A	0.3	1.0A	40	E	10M	T
2N3492	S	N	2N3492	2N3487	AP	115W	C	200	120	100	0	30	90	5.0A	0.3	1.0A	40	E	10M	T
2N3493	S	N			SH	0.15W	A	200	12	8.0	0	40	120	0.5M	0.15	10*			400M	T
2N3494	S	P		2N3494	AH	0.6W	A	200	80	80	0	35		0.1A	0.3	10M	40	E	200M	T
2N3495	S	P		2N3494	AH	0.6W	A	200	120	120	0	35		0.1M	0.35	10M	40	E	150M	T
2N3496	S	P		2N3494	AH	0.4W	A	200	80	80	0	35		0.1A	0.3	10M	40	E	200M	T
2N3497	S	P		2N3494	AH	0.4W	A	200	120	120	0	35		0.1M	0.35	10M	40	E	150M	T
2N3498	S	N		2N3498	AH	1.0W	A	200	100	100	0	40	120	0.15A	0.2	10M	50	E	150M	T
2N3499	S	N		2N3498	AH	1.0W	A	200	100	100	0	100	300	0.15A	0.2	10M	75	E	150M	T
2N3500	S	N		2N3498	AH	1.0W	A	200	150	150	0	40	120	0.15A	0.2	10M	50	E	150M	T
2N3501	S	N		2N3498	AH	1.0W	A	200	150	150	0	100	300	0.15A	0.2	10M	75	E	150M	T
2N3502	S	P	2N2905	2N2904	SH	0.7W	A	200	45	45	0	115	300	50M	0.25	50M	135	E	200M	T
2N3503	S	P	2N2905A	2N2904	SH	0.7W	A	200	60	60	0	115	300	50M	0.25	50M	135	E	200M	T
2N3504	S	P	2N2907	2N2904	SH	0.4W	A	200	45	45	0	115	300	50M	0.25	50M	135	E	200M	T
2N3505	S	P	2N2907A	2N2904	SH	0.4W	A	200	60	60	0	115	300	50M	0.25	50M	135	E	200M	T
2N3506	S	N		2N3506	SH	1.0W	A	200	60	40	0	40	200	1.5A	1.0	1.5A			60M	T
2N3507	S	N		2N3506	SH	1.0W	A	200	80	50	0	30	150	1.5A	1.0	1.5A			60M	T
2N3508	S	N		2N3508	SH	0.4W	A	200	40	20	0	40	120	10M	0.25	10M			500M	T
2N3509	S	N		2N3508	SH	0.4W	A	200	40	20	0	100	300	10M	0.25	10M			500M	T
2N3510	S	N		2N3510	SH	0.36W	A	200	40	10	0	25	150	0.15A	0.25	10M	20	E	350M	T
2N3511	S	N		2N3510	SH	0.36W	A	200	40	15	0	30	120	0.15A	0.25	10M	20	E	450M	T
2N3512	S	N	2N2537	2N2537	SH	0.8W	A	200	60	35	0	10		0.5A	1.0	0.5A			250M	T
2N3513	S	N	2N2480A	2N2060	AM	0.25W	A	200	80	40	0	50	200	1.0M	1.2	50M	50	E	50M	T
2N3514	S	N	2N2480A	2N2060	AM	0.25W	A	175	80	40	0	50	200	1.0M	1.2	50M	50	E	50M	T
2N3515	S	N			AM	0.25W	A	175	80	40	0	50	200	1.0M	1.2	50M	50	E	50M	T
2N3516	S	N			AM	0.25W	A	200	100	60	0	50	200	1.0M	1.2	50M	50	E	60M	T
2N3517	S	N			AM	0.25W	A	175	100	60	0	50	200	1.0M	1.2	50M	50	E	60M	T
2N3518	S	N			AM	0.25W	A	175	100	60	0	50	200	1.0M	1.2	50M	50	E	60M	T
2N3519	S	N			AM	0.25W	A	175	60	30	0	150	600	1.0M	1.0	5.0M	150	E	60M	T
2N3520	S	N			AM	0.25W	A	175	60	30	0	150	600	1.0M	1.0	5.0M	150	E	60M	T
2N3521	S	N			AM	0.3W	A	200	70	55	0	100	300	10*	1.0	10M			30M	T
2N3522	S	N			AM	0.25W	A	200	70	55	0	100	300	10*	1.0	10M			30M	T
2N3523	S	N			AM	0.25W	A	175	70	55	0	100	300	10*	1.0	10M			30M	T
2N3524	S	N			AM	0.25W	A	175	70	55	0	100	300	10*	1.0	10M			30M	T
2N3525	Thyristors, see Table on Page 2-70																			
2N3526	S	N			AH	0.8W	A	200	130	120	0	30	120	30M	1.0	50M	25	E	40M	T
2N3527	S	P			A	0.4W	A	200	30	30	0	25	75	0.1N		0.1N	100	E	5.0M	T
2N3528 thru 2N3541	Thyristors, see Table on Page 2-70																			
2N3541																				
2N3543	S	N			AHP	60W	C	200	65	60	0	10	80	4.5A	1.0	4.5A			150M	T
2N3544	S	N		2N3544	AH	0.3W	A	175	25	25	0	25		10M					600M	T
2N3545	S	P	2N3798	2N3798	SH	0.36W	A	200	20	12	0	40	120	10M	0.2	10M			250M	T
2N3546	S	P		2N3546	SH	0.36W	A	200	15	12	0	30	120	10M	0.15	10M			700M	T
2N3547	S	P	2N3799	2N3799	A	0.36W	A	200	60	60	0	100	500	1.0M	1.0	10M	120	E	45M	T
2N3548	S	P			A	0.4W	A	200	60	45	0	100	300	10*	1.0	10M	150	E	60M	T
2N3549	S	P			A	0.4W	A	200	60	60	0	100	500	10*	1.0	10M	150	E	60M	T
2N3550	S	P			A	0.4W	A	200	60	60	0	200	600	10*	0.9	5.0M	300	E	60M	T
2N3551	S	N			SHP	40W	C	175	115	60	0	20	90	10A	1.0	10A			40M	T
2N3552	S	N			SHP	40W	C	175	140	80	0	20	90	10A	1.0	10A			40M	T
2N3553	S	N	2N3553	2N3375	AHP	7.0W	C	200	65	40	0	10	100	0.25A	1.0	0.25A			400M	T
2N3554	S	N			AHP	0.8W	A	200	60	30	0	25	100	0.75A	0.7	0.75A			150M	T
2N3555 thru 2N3562	Thyristors, see Table on Page 2-70																			
2N3562	S	N			AH	0.2W	A	125	30	12	0	20	200	8.0M			20	E	600M	T
2N3563	S	N			AH	0.2W	A	125	30	15	0	20	500	15M	0.3	20M	20	E	400M	T
2N3564	S	N			AH	0.2W	A	125	30	25	0	150	600	1.0M			120	E	40M	T
2N3565	S	N	MPS6514	MPS6512	A	0.2W	A	125	30	25	0	150	600	1.0M			120	E	40M	T
2N3566	S	N	MPS6514	MPS6512	A	0.3W	A	125	40	30	0	150	600	10M	1.0	0.1A			40M	T
2N3567	S	N	MPS6530	MPS6530	A	0.3W	A	125	80	40	0	40	120	0.15A	0.25	0.15A			60M	T
2N3568	S	N			A	0.3W	A	125	80	40	0	40	120	0.15A	0.25	0.15A			60M	T
2N3569	S	N	MPS6531	MPS6530	A	0.3W	A	125	80	40	0	100	300	0.15A	0.25	0.15A			60M	T
2N3570	S	N			AH	0.2W	A	200	30	15	0	20	150	5.0M			20	E	1.5G	T
2N3571	S	N			AH	0.2W	A	200	25	15	0	20	200	5.0M			20	E	1.5G	T
2N3572	S	N			AH	0.2W	A	200	25	13	0	20	300	5.0M			20	E	1.0G	T
2N3573 thru 2N3575	Field-Effect Transistors, see Table on Page 2-81																			
2N3575	S	P	2N3251	2N3250	SH	0.36W	A	200	20	15	0	40	120	10M	0.15	10M			400M	T
2N3576	S	N			AHP	85W	C	175	100	120	0	12	60	1.0A	5.25	1.0A	12	E	10M	T
2N3577	Field-Effect Transistors, see Table on Page 2-81																			
2N3578	S	P	2N3799	2N3798	AH	0.4W	A	200	60	60	0	30	120	1.0M	0.5	5.0M	30	E	80M	T
2N3579	S	P	2N3799	2N3798	AH	0.4W	A	200	60	60	0	60	240	1.0M	0.5	5.0M	60	E	80M	T
2N3580	S	P	2N3799	2N3798	AH	0.4W	A	200	50	40	0	50	150	0.1M	0.5	5.0M	50	E	30M	T



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(sat)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	Units					Units	Units
2N3582	S	P	2N3799	2N3798	AH	0.4W	A	200	50	40	O	100	300	0.1M	0.5	5.0M	100	E	30M	T	
2N3583	S	N	2N3583		AHP	35W	C	200	250	175	O	40	200	0.5A	5.0	1.0A	25	E	10M	T	
2N3584	S	N	2N3584		SP	35W	C	200	330	250	O	8.0	140	1.0A	0.75	1.0A			10M	T	
2N3585	S	N	2N3585		SP	35W	C	200	440	300	O	8.0	140	1.0A	0.75	1.0A			10M	T	
2N3586	S	P			SC	125M	A	200	45	45	O							0.1M	T		
2N3587	S	N			AM	0.3W	A	200	60	45	O	80	500	1.0M	1.0	10M			80M	T	
2N3588	G	P			AM	0.1W	A	85	25			20		1.0M				200M	T		
2N3589	S	N	2N3738	2N3738	AHP	2.0W	A	175	200	200	R	30	90	0.2A	2.0	0.2A	30	E	15M	T	
2N3590	S	N	2N6233	2N6233	AHP	2.0W	A	175	200	200	R	75	150	0.2A	2.0	0.2A	75	E	15M	T	
2N3591	S	N			AHP	1.0W	A	175	200	200	R	30	90	0.2A	2.0	0.2A	30	E	15M	T	
2N3592	S	N			AHP	1.0W	A	175	200	200	R	75	150	0.2A	2.0	0.2A	75	E	15M	T	
2N3593	S	N			AHP	1.0W	A	175	200	200	R	30	90	0.2A	2.0	0.2A	30	E	15M	T	
2N3594	S	N			AHP	1.0W	A	175	200	200	R	75	150	0.2A	2.0	0.2A	75	E	15M	T	
2N3595	S	N			AHP	1.5W	A	175	200	200	R	30	90	0.2A	2.0	0.2A	30	E	15M	T	
2N3596	S	N			AHP	1.5W	A	175	200	200	R	75	150	0.2A	2.0	0.2A	75	E	15M	T	
2N3597	S	N	MJ7000	MJ7000	SHP	100W	C	200	60	40	O	40	120	10A	0.5	10A	75	E	30M	T	
2N3598	S	N	MJ7000	MJ7000	SHP	100W	C	200	80	60	O	40	120	10A	0.5	10A	75	E	30M	T	
2N3599	S	N	MJ7000	MJ7000	SHP	100W	C	200	100	80	O	40	120	10A	0.5	10A	75	E	30M	T	
2N3600	S	N			AH	0.2W	A	200	30	15	O	20	150	3.0M			40	E	850M	T	
2N3601	G	P			SP	0.286W	C	100	100	40	O	60	180	1.0A	0.2	0.1A	50	E	20M	T	
2N3602	G	P			SP	0.286W	C	100	100	40	O	60	180	1.0A	0.2	0.1A	50	E	20M	T	
2N3603	G	P			SP	0.286W	C	100	130	55	O	60	180	1.0A	0.2	0.1A	50	E	20M	T	
2N3604	G	P			SP	0.286W	C	100	130	55	O	60	180	1.0A	0.2	0.1A	50	E	20M	T	
2N3605	S	N	MPS3646	MPS3646	S	0.2W	A	150	18	14	O	30		10M	0.25	10M			300M	T	
2N3605A	S	N			S	320M	A	120	40	15	O	30	120	10M	0.25	10M			300M	T	
2N3606	S	N	MPS3646	MPS3646	S	0.2W	A	150	18	14	O	30		10M	0.25	10M			300M	T	
2N3606A	S	N			S	320M	A	120	40	15	O	30	120	10M	0.25	10M			300M	T	
2N3607	S	N	MPS3646	MPS3646	S	0.2W	A	150	18	14	O	30		10M	0.25	10M			300M	T	
2N3608	Field-Effect Transistors, see Table on Page 2-81																				
2N3610	G	P			AP	85W	C	110	40	30	S	35	70	3.0A	0.25	3.0A	40	E	0.3M	T	
2N3611	G	P			AP	85W	C	110	60	45	S	35	70	3.0A	0.25	3.0A	40	E	0.3M	T	
2N3612	G	P			AP	85W	C	110	40	30	S	60	120	3.0A	0.25	3.0A	60	E	0.3M	T	
2N3613	G	P			AP	85W	C	110	60	45	S	60	120	3.0A	0.25	3.0A	60	E	0.3M	T	
2N3614	G	P			AP	85W	C	110	80	60	S	30	60	3.0A	0.25	3.0A	40	E	0.3M	T	
2N3615	G	P			AP	85W	C	110	80	60	S	30	60	3.0A	0.25	3.0A	40	E	0.3M	T	
2N3616	G	P			AP	85W	C	110	100	75	S	30	60	3.0A	0.25	3.0A	40	E	0.3M	T	
2N3617	G	P			AP	85W	C	110	80	60	S	45	90	3.0A	0.25	3.0A	60	E	0.3M	T	
2N3618	G	P			AP	85W	C	110	100	75	S	45	90	3.0A	0.25	3.0A	60	E	0.3M	T	
2N3619	S	N			AHP	7.5W	C	175	75	40	O	40		1.0A	0.75	1.0A			200M	T	
2N3620	S	N			AHP	7.5W	C	175	75	40	O	40		1.0A	1.0	3.0A			200M	T	
2N3621	S	N			AHP	30W	C	175	75	40	O	40		1.0A	1.25	5.0A			200M	T	
2N3622	S	N			AHP	30W	C	175	75	40	O	40		1.0A	1.25	5.0A			200M	T	
2N3623	S	N			AHP	7.5W	C	175	75	40	O	40		1.0A	0.75	1.0A			200M	T	
2N3624	S	N			AHP	7.5W	C	175	75	40	O	40		1.0A	1.0	3.0A			200M	T	
2N3625	S	N			AHP	30W	C	175	75	40	O	40		1.0A	1.25	5.0A			200M	T	
2N3626	S	N			AHP	30W	C	175	75	40	O	40		1.0A	1.25	5.0A			200M	T	
2N3627	S	N			AHP	7.5W	C	175	100	50	O	40		1.0A	0.75	1.0A			200M	T	
2N3628	S	N			AHP	7.5W	C	175	100	50	O	40		1.0A	1.0	3.0A			200M	T	
2N3629	S	N			AHP	30W	C	175	100	50	O	40		1.0A	1.25	5.0A			200M	T	
2N3630	S	N			AHP	30W	C	175	100	50	O	40		1.0A	1.25	5.0A			200M	T	
2N3631	Field-Effect Transistors, see Table on Page 2-81																				
2N3632	S	N	2N3632	2N3375	AHP	23W	C	200	65	40	O	10	150	0.25A	1.0	1.0A			250M	T	
2N3633	S	N			SH	0.3W	A	200	15	6.0	O	50	150	10M	0.21	3.0M			1.3G	T	
2N3634	S	P			AH	1.0W	A	200	140	140	O	50	150	50M			40	E	150M	T	
2N3635	S	P			AH	1.0W	A	200	140	140	O	100	300	50M			80	E	200M	T	
2N3636	S	P			AH	1.0W	A	200	175	175	O	50	150	50M			80	E	150M	T	
2N3637	S	P			AH	1.0W	A	200	175	175	O	100	300	50M			80	E	200M	T	
2N3638	S	P			SH	0.3W	A	125	25	25	O	30		50M	0.25	50M	25	E	100M	T	
2N3638A	S	P			SH	0.3W	A	125	25	25	O	100		50M	0.25	50M	100	E	150M	T	
2N3639	S	P	MPS3639	MPS3639	SH	0.2W	A	125	6.0	6.0	O	30	120	10M	0.16	10M			500M	T	
2N3640	S	P	MPS3640	MPS3640	SH	0.2W	A	125	12	12	O	30	120	10M	0.2	10M			500M	T	
2N3641	S	N	MPS6530	MPS6530	AHP	0.35W	A	125	60	30	O	40	120	0.15A	0.22	0.15A			250M	T	
2N3642	S	N	MPS6530	MPS6530	AHP	0.35W	A	125	60	45	O	40	120	0.15A	0.22	0.15A			250M	T	
2N3643	S	N	MPS6531	MPS6530	AHP	0.35W	A	125	60	30	O	100	300	0.15A	0.22	0.15A			250M	T	
2N3644	S	P			SH	0.3W	A	125	45	45	O	80	240	50M	0.25	50M			200M	T	
2N3645	S	P			SH	0.3W	A	125	60	60	O	80	240	50M	0.25	50M			200M	T	
2N3646	S	N	MPS3646	MPS3646	SH	0.2W	A	125	40	15	O	30	120	30M	0.2	30M			350M	T	
2N3647	S	N	2N3510	2N3510	SH	0.4W	A	200	40	10	O	25	150	0.15A	0.25	10M	20	E	350M	T	
2N3648	S	N			SH	0.4W	A	200	40	15	O	30	120	0.15A	0.25	10M			450M	T	
2N3649	Thyristors, see Table on Page 2-70																				
2N3650	S	N			AH	4.0W	C	200	220	170	O	20		10M			20	E	50M	T	
2N3659	S	P	2N3719		AHP	5.0W	C	200	40	30	O	25	100	0.5A	1.2	0.5A			25M	T	
2N3660	S	P	2N3720		AHP	5.0W	C	200	60	50	O	25	100	0.5A	1.2	0.5A			25M	T	
2N3661	S	N			AH	0.2W	A	125	18	12	O	20		8.0M					700M	T	
2N3662	S	N			AH	0.2W	A	125	30	12	O	20		8.0M					700M	T	
2N3663	S	N			AHP	5.0W	C	200	60	60	S	8.0	80	50M	0.75	0.25A			300M	T	
2N3664	S	N	2N5335	2N5334	S	5.0W	C	200	120	80	O	40	120	0.15A	0.5	0.15A			60M	T	
2N3665	S	N			S	5.0W	C	200	120	80	O	100	300	0.15A	0.5	0.15A			60M	T	
2N3666	S	N	2N5881	2N5879	SP	117W	C	200	50	50	O	15	60	8.0A	1.5	8.0A			0.5M	T	
2N3667	Thyristors, see Table on Page 2-70																				
2N3																					



2N3675-2N3765

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	Units					Units	Units
2N3675	S	N	2N4238	2N4237	SP	8.8W	C	200	90	55	0	12	60	1.0A	0.8	1.0A		1.0M	T		
2N3676	S	N	2N4239	2N4237	SP	8.8W	C	200	90	90	0	12	60	1.0A	0.8	1.0A		1.0M	T		
2N3677	S	N	2N3019	2N3019	SC	0.4W	A	200	30	20	0							5.0M	T		
2N3678	S	N		2N3019	SH	0.8W	A	200	75	55	0	40	120	0.15A	0.4	0.15A		250M	T		
2N3679	Unijunction Transistors, see Table on Page 2-88																				
2N3680	S	N			AM	0.3W	A	200	60	50	0	150	600	10*	0.7	10M	300	60M	T		
2N3681	S	N			AH	0.2W	A	200	10	7	0	20	220	2.0M	0.37	4.0M	20	1.0G	T		
2N3682	S	N			AH	0.36W	A	200	40	15	0	40	120	10M			45	600M	T		
2N3683	S	N			AH	0.2W	A	200	30	12	0	20	150	8.0M			30	1.0G	T		
2N3684, A	Field-Effect Transistors, see Table on Page 2-81																				
2N3687, A																					
2N3688	S	N			AH	0.2W	A	125	40	40	0	30		4.0M				400M	T		
2N3689	S	N			AH	0.2W	A	125	40	40	0	30		4.0M				400M	T		
2N3690	S	N			AH	0.2W	A	125	40	40	0	30		4.0M				400M	T		
2N3691	S	N	MPS6512	MPS6512	A	0.2W	A	125	35	20	0	40	160	10M	0.7	10M	40	200M	T		
2N3692	S	N	MPS6513	MPS6512	A	0.2W	A	125	35	20	0	100	400	10M	0.7	10M	100	200M	T		
2N3693	S	N			AH	0.2W	A	125	45	45	0	40	160	10M				200M	T		
2N3694	S	N			AH	0.2W	A	125	45	45	0	100	400	10M				200M	T		
2N3695	Field-Effect Transistors, see Table on Page 2-81																				
2N3698																					
2N3700	S	N	2N3019	2N3019	AH	0.5W	A	200	140	80	0	100	300	0.15A	0.2	0.15A	80	100M	T		
2N3701	S	N	2N3019	2N3019	AH	0.5W	A	200	140	80	0	40	120	0.15A	0.2	0.15A	30	80M	T		
2N3702	S	P	2N3250	2N3250	A	0.3W	A	150	40	25	0	60	300	50M	0.25	50M		100M	T		
2N3703	S	P	2N3251	2N3250	A	0.3W	A	150	50	30	0	30	150	50M	0.25	50M		100M	T		
2N3704	S	N	2N2222A	2N2218	A	0.36W	A	150	50	30	0	100	300	50M	0.6	0.1A		100M	T		
2N3705	S	N	2N2222A	2N2218	A	0.36W	A	150	50	30	0	50	150	50M	0.8	0.1A		100M	T		
2N3706	S	N	2N930	2N929	A	0.36W	A	150	40	20	0	30	600	50M	1.0	0.1A		100M	T		
2N3707	S	N			A	0.25W	A	150	30	30	0	100	400	0.1M	1.0	10M	100	45E	E		
2N3708	S	N			A	0.25W	A	150	30	30	0	45	660	1.0M	1.0	10M	45	45E	E		
2N3709	S	N			A	0.25W	A	150	30	30	0	45	165	1.0M	1.0	10M	45	45E	E		
2N3710	S	N			A	0.25W	A	150	30	30	0	90	330	1.0M	1.0	10M	90	90E	E		
2N3711	S	N			A	0.25W	A	150	30	30	0	180	660	1.0M	1.0	10M	180	180E	E		
2N3712	S	N		2N3712	AH	0.8W	A	200	150	150	0	30	150	30M	2.0	50M	25	40M	T		
2N3713	S	N	2N3713	2N3713	AHP	150W	C	200	80	60	0	25	75	1.0A	1.0	5.0A	25	30K	E		
2N3714	S	N	2N3714	2N3713	AHP	150W	C	200	100	80	0	25	75	1.0A	1.0	5.0A	25	30K	E		
2N3715	S	N	2N3715	2N3713	AHP	150W	C	200	80	60	0	50	150	1.0A	0.8	5.0A	25	30K	E		
2N3716	S	N	2N3716	2N3713	AHP	150W	C	200	100	80	0	50	150	1.0A	0.8	5.0A	25	30K	E		
2N3717	S	N			AHP	7.5W	C	200	60	60	S	2.0	100	0.5A	1.0	0.5A		250M	T		
2N3718	S	N			AHP	10W	C	200	60	60	S	2.0	100	0.5A	1.0	0.5A		250M	T		
2N3719	S	P	2N3719	2N3719	SHP	6.0W	C	200	40	40	0	25	180	1.0A	1.5	3.0A	60	60M	T		
2N3720	S	P	2N3720	2N3719	SHP	6.0W	C	200	60	60	0	25	180	1.0A	1.5	3.0A		60M	T		
2N3721	S	N	MP3731		A	0.2W	A	125	18	18	0								T		
2N3722	S	N		2N3722	S	0.8W	A	200	80	60	0	40	150	0.1A	0.22	0.1A	60	300M	T		
2N3723	S	N		2N3722	SH	0.8W	A	200	100	80	0	40	150	0.1A	0.25	10M		300M	T		
2N3724	S	N	MM3724	MM3722	SH	0.8W	A	200	50	30	0	60	150	0.1A	0.2	0.1A		300M	T		
2N3724A	S	N			SH	1W	A	200	50	30	0	60	150	100M	0.2	100M		300M	T		
2N3725	S	N	MM3725	MM3724	SH	0.8W	A	200	80	50	0	60	150	0.1A	0.26	0.1A		300M	T		
2N3725A	S	N			SH	1W	A	200	80	50	0	60	150	100M	0.26	100M	3		T		
2N3726	S	P			AM	0.4W	A	200	45	45	0	135	350	1.0M	0.25	50M	135	200M	T		
2N3727	S	P			AM	0.4W	A	200	45	45	0	135	350	1.0M	0.25	50M	135	200M	T		
2N3728	S	N			AM	0.45W	A	200	60	30	0	80	280	0.15A	0.22	0.15A	50	250M	T		
2N3729	S	N			AM	0.45W	A	200	60	30	0	80	280	0.15A	0.22	0.15A	50	250M	T		
2N3730	G	P			AP	10W	A	100	200	200	S	15							T		
2N3731	G	P			AP	5.0W	A	100	320	320	S	15		6.0A					T		
2N3732	G	P			AP	3.0W	A	100	100	100	S	35	500	0.7A					T		
2N3733	S	N			AHP	23W	C	200	65	40	0	10	150	0.25A	1.0	1.0A		1.0M	T		
2N3734	S	N		2N3734	SH	1.0W	A	200	50	30	0	30	120	1.0A	0.2	10M		250M	T		
2N3734A	S	N	2N5334	2N5334	SH	1.0W	A	200	50	30	0	30	120	1.0A	0.9	1.0A	2.5	300M	T		
2N3735	S	N		2N3734	SH	1.0W	A	200	75	50	0	20	80	1.0A	0.2	10M		250M	T		
2N3735A	S	N			SH	1.0W	A	200	75	50	0	20	80	1.0A	0.2	10M		250M	T		
2N3736	S	N		2N3734	SH	0.5W	A	200	50	30	0	30	120	1.0A	0.9	1.0A	2.5	300M	T		
2N3736A	S	N			SH	0.5W	A	200	50	30	0	30	120	1.0A	0.9	1.0A	2.5		T		
2N3737	S	N		2N3734	SH	0.5W	A	200	75	50	0	20	80	1.0A	0.2	10M		250M	T		
2N3737A	S	N			SH	0.5W	A	200	75	50	0	20	80	1.0A	0.9	1.0A	2.5		T		
2N3738	S	N	2N3738	2N3738	AP	20W	C	175	250	225	0	40	200	0.1A	2.5	0.25A	35	15M	T		
2N3739	S	N	2N3739	2N3738	AP	20W	C	175	325	300	0	40	200	0.1A	2.5	0.25A	35	15M	T		
2N3740, A	S	P	2N3740, A	2N3740	AP	25W	C	200	60	60	0	30	100	0.25A	0.6	1.0A	25	4.0M	T		
2N3741, A	S	P	2N3741, A	2N3740	AP	25W	C	200	60	60	0	30	100	0.25A	0.6	1.0A	25	4.0M	T		
2N3742	S	N		2N3742	AH	1.0W	A	200	300	300	0	20	200	30M	1.0	10M	20	30M	T		
2N3743	S	P		2N3743	AH	1.0W	A	200	300	300	0	25	250	30M	1.0	10M	30	30M	T		
2N3744	S	N	2N5346	2N5346	AHP	30W	C	200	60	40	0	20	60	1.0A	0.25	1.0A	20	30M	T		
2N3745	S	N	2N5346	2N5346	AHP	30W	C	200	80	60	0	20	60	1.0A	0.25	1.0A	20	30M	T		
2N3746	S	N	2N5346	2N5346	AHP	30W	C	200	100	80	0	20	60	1.0A	0.25	1.0A	20	30M	T		
2N3747	S	N	2N5347	2N5346	AHP	30W	C	200	60	40	0	40	120	1.0A	0.25	1.0A	40	40M	T		
2N3748	S	N	2N5347	2N5346	AHP	30W	C	200	80	60	0	40	120	1.0A	0.25	1.0A	40	40M	T		
2N3749	S	N	2N5348	2N5346	AHP	30W	C	200	100	80	0	40	120	1.0A	0.25	1.0A	40	40M	T		
2N3750	S	N	2N5348	2N5346	AHP	30W	C	200	60	40	0	100	300	1.0A	0.25	1.0A	40	40M	T		
2N3751	S	N	2N5348	2N5346	AHP	30W	C	200	80	60	0	100	300	1.0A	0.25	1.0A	100	50M	T		
2N3752	S	N	2N5348	2N5346	AHP	30W	C	200	100	80	0	100	300	1.0A	0.25	1.0A	100	50M	T		
2N3753	Thyristors, see Table on Page 2-70																				
2N3761																					
2N3762	S	P		2N3762	SH	1.0W	A	200	40	40	0	30	120	1.0A	0.1	10M		180M	T		
2N3763	S	P		2N3762	SH	1.0W	A	200	60	60	0	20	80	1.0A</							



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	Units					Units	Units
2N3766	S	N	2N3766	2N3766	AP	20W	C 175	80	60	0	40	160	0.5A	2.5	1.0A	40	E	15M	T	15M	T
2N3767	S	N	2N3767	2N3766	AP	20W	C 175	100	80	0	40	160	0.5A	2.5	1.0A	40	E	15M	T	15M	T
2N3770	G	P			AH	50M	A 100	10	6.0	0	10	200	1.0M			10	E	100M	T	100M	T
2N3771	S	N	2N3771	2N3771	AP	150W	C 200	50	40	0	15	60	10A	2.0	15A	40	E	0.2M	T	0.2M	T
2N3772	S	N	2N3772	2N3771	AP	150W	C 200	100	60	0	15	60	10A	1.4	10A	40	E	0.2M	T	0.2M	T
2N3773	S	N	2N3773		AP	150W	C 200	160	140	0	15	60	8.0A	1.4	8.0A	40	E	0.2M	T	0.2M	T
2N3774	S	P	2N4234	2N4234	SP	5.0W	C 200	40	40	0	20	60	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3775	S	P	2N4235	2N4234	SP	5.0W	C 200	60	60	0	20	60	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3776	S	P	2N4236	2N4234	SP	5.0W	C 200	80	80	0	20	60	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3777	S	P	2N5679	2N5679	SP	5.0W	C 200	100	100	0	20	60	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3778	S	P	2N4234	2N4234	SP	5.0W	C 200	40	40	0	10	40	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3779	S	P	2N4235	2N4234	SP	5.0W	C 200	60	60	0	10	40	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3780	S	P	2N4236	2N4234	SP	5.0W	C 200	80	80	0	10	40	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3781	S	P	2N5679	2N5679	SP	5.0W	C 200	100	100	0	10	40	0.2A	0.2	0.2A			1.0M	T	1.0M	T
2N3782	S	P	2N4234	2N4234	SP	5.0W	C 200	40	40	0	10	60	1.0A	0.75	1.0A			1.0M	T	1.0M	T
2N3783	G	P		2N3783	AH	0.15W	A 100	30	20	0	20	200	3.0M	0.25	5.0M	20	E	0.8G	T	0.8G	T
2N3784	G	P		2N3783	AH	0.15W	A 100	30	20	0	20	200	3.0M	0.25	5.0M	20	E	0.7G	T	0.7G	T
2N3785	G	P		2N3783	AH	0.15W	A 100	15	12	0	15	200	3.0M	0.35	5.0M	15	E	0.7G	T	0.7G	T
2N3788	S	N			AP	100W	C 200	400	325	0	20	180	0.50A					50K	T	50K	T
2N3789	S	P			AP	150W	C 200	60	60	0	25	90	1.0A	1.0	5.0A	25	E	30K	T	30K	T
2N3790	S	P			AP	150W	C 200	60	80	0	25	90	1.0A	1.0	5.0A	25	E	30K	T	30K	T
2N3791	S	P			AP	150W	C 200	60	60	0	50	180	1.0A	1.0	5.0A	25	E	30K	T	30K	T
2N3792	S	P			AP	150W	C 200	80	80	0	50	180	1.0A	1.0	5.0A	25	E	30K	T	30K	T
2N3793	S	N	MPS6530	MPS6530	A	0.25W	A 125	40	20	0	20	120	10M	0.4	10M			100M	T	100M	T
2N3794	S	N	MPS6531	MPS6530	A	0.25W	A 125	40	20	0	100	600	10M	0.4	10M			100M	T	100M	T
2N3795	S	P			SP	5.0W	C 200	120	120	0	12	36	10M	0.2	10M			0.5M	T	0.5M	T
2N3796	Field-Effect Transistors, see Table on Page 2-81																				
2N3798	S	P		2N3798	A	0.36W	A 200	60	60	0	150	450	0.5M	0.2	0.1M	150	E	30M	T	30M	T
2N3799	S	P		2N3798	A	0.36W	A 200	60	60	0	300	900	0.5M	0.2	0.1M	300	E	30M	T	30M	T
2N3800	S	P		2N3800	A	0.25W	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3801	S	P		2N3800	A	0.25W	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3802	S	P		2N3800	AM	0.25W	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3803	S	P		2N3800	AM	0.25W	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3804	S	P		2N3800	AM	0.25W	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3804A	S	P		2N3800	AM	0.25W	C 200	60	60	0	150	450	100*	0.2	100*	150	E	30M	T	30M	T
2N3805	S	P		2N3800	AM	0.25W	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3805A	S	P		2N3800	AM	0.25W	C 200	60	60	0	300	900	100*	0.2	100*	300	E	30M	T	30M	T
2N3806	S	P		2N3800	A	0.5W	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3807	S	P		2N3800	A	0.5W	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3808	S	P		2N3800	AM	0.5W	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3809	S	P		2N3800	AM	0.5W	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3810	S	P		2N3800	AM	0.5W	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3810A	S	P		2N3800	AM	0.50W	A 200	60	60	0	150	450	100*	0.2	100*	150	E	30M	T	30M	T
2N3811	S	P		2N3800	AM	0.5W	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3811A	S	P		2N3800	AM	0.50W	A 200	60	60	0	300	900	100*	0.2	100*	300	E	30M	T	30M	T
2N3812	S	P		2N3800	AM	350M	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3813	S	P		2N3800	AM	350M	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3814	S	P		2N3800	AM	350M	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3815	S	P		2N3800	AM	350M	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3816	S	P		2N3800	AM	350M	A 200	60	60	0	150	450	0.1M	0.2	0.1M	150	E	100M	T	100M	T
2N3816A	S	P		2N3800	AM	0.25W	C 200	60	60	0	150	450	100*	0.2	100*	150	E	30M	T	30M	T
2N3817	S	P		2N3800	AM	350M	A 200	60	60	0	300	900	0.1M	0.2	0.1M	300	E	100M	T	100M	T
2N3817A	S	P		2N3800	AM	0.25W	C 200	60	60	0	300	900	100*	0.2	100*	300	E	30M	T	30M	T
2N3818	S	N		2N3818	AHP	25W	C 175	60	60	S	5.0	50	400M	0.5	1.0A	3.0	E				
2N3819	Field-Effect Transistors, see Table on Page 2-81																				
2N3824	S	N	MPS3398		AH	0.25W	A 150	30	15	0	20		2.0M	0.25	2.0M			200M	T	200M	T
2N3825	S	N	MPS3826		AH	0.2W	A 150	60	45	0	40	160	10M					200M	T	200M	T
2N3827	S	N	MPS3827		AH	0.2W	A 150	60	45	0	100	400	10M					200M	T	200M	T
2N3828	S	N	MPS6565		AH	0.3W	A 150	40	40	0	30	200	12M					360M	T	360M	T
2N3829	S	P	2N2193	2N2192	SH	0.36W	A 200	35	20	0	30	120	30M	0.18	10M			350M	T	350M	T
2N3830	S	N	2N2193	2N2192	SH	1.0W	A 200	80	50	0	30		0.15A	0.3	0.15A			200M	T	200M	T
2N3831	S	N	2N2193	2N2192	SH	1.0W	A 200	70	40	0	35		0.15A	0.3	0.15A			200M	T	200M	T
2N3832	S	N			SH	0.2W	A 200	15	6.0	0	25	125	2.0M	0.4	10M			800M	T	800M	T
2N3833	S	N			AHP			25	15	0	20		30M			2.5	E				
2N3834	S	N			AHP			25	15	0	20		30M			2.5	E				
2N3835	S	N			AHP			25	15	0	20		30M			2.5	E				
2N3836	S	N			SHP	1.0W	A 200	80	60	0	2K	20K	2.0A	1.8	5.0A			40M	T	40M	T
2N3837	S	N			SHP	1.0W	A 200	100	80	0	2K	20K	2.0A	1.8	5.0A			40M	T	40M	T
2N3838	S	N,P	2N3838		SH	0.25W	A 200	60	40	0	100	300	0.15A	0.4	0.15A	60	E	200M	T	2.0G	T
2N3839	S	N	2N2857		AH	200M	A 200	30	15	0	30		3.0M		</						



## 2N3856-2N3961

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CE</sub> (volts)	V <sub>CE</sub> — Subscript	h <sub>FE</sub> @ I <sub>C</sub> (min) (max)	Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub> (volts)	Units	h <sub>FE</sub> — Subscript	f <sub>T</sub> — Units	Subscript			
2N3856	S	N	MPS6513	MPS6512	AH	0.2W	A	150	18	18	0	100	200	2.0M				140M	T	
2N3856A	S	N	MPS6513	MPS6512	AH	0.2W	A	150	30	30	0	100	200	2.0M				140M	T	
2N3857	S	P			A	0.6W	A	200	45	45	0	50	200	1.0M	0.1	10M	45	E	4.0M	T
2N3858	S	N	MPS6512	MPS6512	AH	0.2W	A	125	30	30	0	60	120	2.0M				90M	T	
2N3858A	S	N	MPS6566	MPS6565	AH	200M	A	100	60	60	0	45		1.0M				90M	T	
2N3859	S	N	MPS6513	MPS6512	AH	0.2W	A	125	30	30	0	100	200	2.0M				90M	T	
2N3859A	S	N	MPS6566	MPS6565	A	200M	A	100	60	60	0	75		1.0M				90M	T	
2N3860	S	N	MPS6514	MPS6512	AH	0.2W	A	125	30	30	0	150	300	2.0M				90M	T	
2N3861	S	N			AP	2.0W	A	175	530	530	V	30	200	25M	1.5	25M	20	E	50M	T
2N3862	S	N	2N930	2N930	S	0.36W	A	200	50	20	0	50	150	10M	0.25	10M			600M	T
2N3863	S	N	2N3715	2N3713	SP	117W	C	200	70	50	0	30	90	3.0A	1.0	3.0A			0.5M	T
2N3864	S	N	2N5758	2N5758	SP	117W	C	200	110	90	0	30	90	3.0A	1.0	3.0A			0.5M	T
2N3865	S	N	2N3760		SP	117W	C	200	160	150	0	30	90	3.0A	1.0	3.0A			0.5M	T
2N3866	S	N		2N3866	AHP	5.0W	C	200	55	30	0	10	200	50M	1.0	0.1A			500	T
2N3866A	S	N		2N3866	A	5.0W	C		55	30	0	25	200	0.05A	1.0	0.1A			800M	T
2N3867	S	P	2N3867		SH	1.0W	A	200	40	40	0	40	200	1.5A	0.75	1.5A			60M	T
2N3868	S	P	2N3868		SH	1.0W	A	200	60	60	0	30	150	1.5A	0.75	1.5A			60M	T
2N3869	S	N			AHP	2.5W	C	175	40	20	0	20	150	30M	0.7	0.45A			0.4G	T
2N3870 thru 2N3873	Thyristors, see Table on Page 2-70																			
2N3873	S	N	2N6274		AP	150W	C	175	140	50	0	25	150	10A	1.0	10A	80	E	50M	T
2N3876	S	N	2N4410	2N4409	A	0.2W	A	150	70	70	0	20	250	2.0M						
2N3877	S	N	2N4410	2N4409	A	0.2W	A	150	85	85	0	20	250	2.0M						
2N3877A	S	N	2N4410	2N4409	A	0.2W	A	150	85	85	0	20	250	2.0M						
2N3878	S	N	2N5424	2N5427	AHP	35W	C	200	120	50	0	40	200	0.5A	2.0	4.0A	40	E	40M	T
2N3879	S	N			SP	35W	C	200	120	75	0	12	100	4.0A	1.2	4.0A			40M	T
2N3880	S	N			AH	0.2W	A	200	30	15	0	30	200	3.0M					1.2G	T
2N3881	S	N			AH	0.6W	A	200	60	35	0				1.5	0.15A	50	E	70M	T
2N3882	Field-Effect Transistors, see Table on Page 2-81																			
2N3883	G   P		2N3883	SH	0.3W	A	100	25	15	0	30		0.2A	0.5	0.2A			100M	T	
2N3884 thru 2N3899	Thyristors, see Table on Page 2-70																			
2N3900	S	N	2N5088	2N5088	A	0.2W	A	125	18	18	0	250	500	2.0M				170	E	
2N3900A	S	N	2N5088	2N5088	A	0.2W	A	125	18	18	0	250	500	2.0M				170	E	
2N3901	S	N	2N5088	2N5088	A	0.2W	A	125	18	18	0	350	700	2.0M				350	E	
2N3902	S	N	2N3902	2N3902	SP	100W	C	150	400	400	0	20	100	1.0A	2.5	2.5A			40K	E
2N3903	S	N		2N3903	SH	0.31W	A	135	60	40	0	50	150	10M	0.2	10M	50	E	250M	T
2N3904	S	N		2N3903	SH	0.31W	A	135	60	40	0	100	300	10M	0.2	10M	100	E	300M	T
2N3905	S	P		2N3905	SH	0.31W	A	135	40	40	0	50	150	10M	0.25	10M	50	E	200M	T
2N3906	S	P		2N3905	SH	0.31W	A	135	40	40	0	100	300	10M	0.25	10M	100	E	250M	T
2N3907	S	N	2N2915	2N2913	AM	0.3W	A	200	60	45	0	60	300	10*	0.35	1.0M			60M	T
2N3908	S	N	2N2916	2N2913	AM	0.3W	A	200	60	60	0	100	500	10*	0.35	1.0M			60M	T
2N3909, A	Field-Effect Transistors, see Table on Page 2-81																			
2N3910	S	P			SC	0.5W	A	200	60	50	0	40	160	1.0M	0.3	10M			4.0M	T
2N3911	S	P			SC	0.5W	A	200	60	40	0	60	240	1.0M	0.3	10M			8.0M	T
2N3912	S	P			SC	0.5W	A	200	60	30	0	90		1.0M	0.3	10M			10M	T
2N3913	S	P			SC	0.4W	A	200	60	50	0	40	160	1.0M	0.3	10M			4.0M	T
2N3914	S	P			SC	0.4W	A	200	60	40	0	60	240	1.0M	0.3	10M			8.0M	T
2N3915	S	P			SC	0.4W	A	200	60	30	0	90		1.0M	0.3	10M			10M	T
2N3916	S	N			AP	5.0W	C	150	150	150	0	40	200	0.15A	5.0	0.15A	30	E	50M	T
2N3917	S	N			AP	20W	C	150	80	40	0	30	120	1.0A	1.2	1.0A	15	E	50M	T
2N3918	S	N			AP	20W	C	150	80	40	0	100	300	1.0A	1.2	1.0A	30	E	50M	T
2N3919	S	N			SP	15W	C	150	120	60	0	40	120	2.0A	1.2	1.0A			80M	T
2N3920	S	N			SP	15W	C	150	120	60	0	100	300	2.0A	1.2	1.0A			80M	T
2N3921	Field-Effect Transistors, see Table on Page 2-81																			
2N3922	S	N			AH	0.8W	A	200	150	150	0	30	120	25M	1.0	25M	20	E	40M	T
2N3923	S	N			AHP	7.0W	C	200	36	18	0								250M	T
2N3924	S	N		2N3924	AHP	10W	C	200	36	18	0								250M	T
2N3925	S	N		2N3924	AHP	11.6W	C	200	36	18	0								250M	T
2N3926	S	N		2N3924	AHP	23.2W	C	200	36	18	0								250M	T
2N3927	S	N		2N3924	AHP	23.2W	C	200	36	18	0								200M	T
2N3928	S	N			SHP	7.5W	C	175	80	40	0	20	300	1.5A	5.0	1.5A			200M	T
2N3929	S	N			SHP	30W	C	175	80	40	0	20	300	1.5A	5.0	1.5A			200M	T
2N3930	S	P			A	0.4W	A	200	180	180	0	80	300	10M	0.25	10M	100	E	40M	T
2N3931	S	P			A	0.7W	A	200	180	180	0	80	300	10M	0.25	10M	100	E	40M	T
2N3932	S	N			AH	0.2W	A	200	30	20	0	40	150	2.0M			50	E	750M	T
2N3933	S	N			AH	0.2W	A	200	40	30	0	60	200	2.0M			60	E	750M	T
2N3934	Field-Effect Transistors, see Table on Page 2-81																			
2N3935	Thyristors, see Table on Page 2-70																			
2N3936 thru 2N3940	Thyristors, see Table on Page 2-70																			
2N3941	S	N			AM	0.75W	C	200	60	45	0	400		10*			300	E	200M	T
2N3942	S	N			AM	0.75W	C	200	60	45	0	400		10*			300	E	200M	T
2N3943	S	N			AM	0.5W	C	200	60	45	0	400		10*			300	E	200M	T
2N3944	S	N			AM	0.5W	C	200	60	45	0	400		10*			300	E	200M	T
2N3945	S	N	2N5334	2N5334	S	5.0W	C	200	70	50	0	40	250	0.15A	0.5	0.15A			60M	T
2N3946	S	N		2N3946	SH	360M	A	200	60	40	0	50	150	10M	0.3	50M	50	E	250M	T
2N3947	S	N		2N3946	SH	360M	A	200	60	40	0	100	300	10M	0.3	50M	100	E	300M	T
2N3948	S	N		2N3948	AHP	1.0W	A	200	36	20	0	15		50M					700M	T
2N3950	S	N		2N3950	AHP	70W	C	200	65	35	0								150M	T
2N3953	S	N			AH	0.2W	A	200	15	12	0	30	360	2.0M			40	E	1.3G	T
2N3954	Field-Effect Transistors, see Table on Page 2-81																			
2N3954, A	Field-Effect Transistors, see Table on Page 2-81																			
2N3955, A	Field-Effect Transistors, see Table on Page 2-81																			
2N3956 thru 2N3958	Field-Effect Transistors, see Table on Page 2-81																			
2N3958	S	N		2N3959	SH	400M	A	200	20	12	0	40	200	10M	0.3	30M	13	E	1.3G	T
2N3959	S	N		2N3959	SH	400M	A	200	20	12	0	40	200	10M	0.3	30M	16	E	1.6G	T
2N3960	S	N		2N3959	AHP	10W	C	200	65	40	0								400M	T
2N3961	S	N		2N3959	AHP	10W	C	200	65	40	0								400M	T



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —		Subscript	f <sub>T</sub> —	Subscript
2N3962	S	P			A	0.36W	A	200	60	60	0	100	300	10*	0.25	10M	100	E	40M	T
2N3963	S	P			A	0.36W	A	200	80	80	0	100	300	10*	0.25	10M	100	E	40M	T
2N3964	S	P			A	0.36W	A	200	45	45	0	250	500	10*	0.25	10M	250	E	50M	T
2N3965	S	P			A	0.36W	A	200	60	60	0	250	500	10*	0.25	10M	250	E	50M	T
2N3966	Field-Effect Transistors, see Table on Page 2-81																			
2N3972	S	N	2N4400	2N4400	S	0.36W	A	150	60	30	0	35	100	10M	0.3	0.15A			200M	T
2N3973	S	N	2N4401	2N4400	S	0.36W	A	150	60	30	0	55	200	10M	0.3	0.15A			200M	T
2N3975	S	N	2N4400	2N4400	S	0.36W	A	150	60	30	0	35	100	10M	0.3	0.15A			200M	T
2N3976	S	N	2N4401	2N4400	S	0.36W	A	150	60	30	0	55	200	10M	0.3	0.15A			200M	T
2N3977	S	P			SC	0.4W	A	200	15	10	0	40		5.0M	0.1	5.0M			1.0M	T
2N3978	S	P			SC	0.4W	A	200	25	20	0	30		5.0M	0.15	5.0M			1.0M	T
2N3979	S	P			SC	0.4W	A	200	40	35	0	20		5.0M	0.15	5.0M			1.0M	T
2N3980	Unijunction Transistors, see Table on Page 2-81																			
2N3981	S	N	2N2219	2N2218	SH	0.8W	A	200	60	30	0	30	120	0.15A	0.4	0.15A			250M	T
2N3982	S	N	2N2218	2N2218	SH	0.8W	A	200	50	20	0	40	140	0.15A	0.4	0.15A			250M	T
2N3983	S	N			AH	0.2W	A	150	30	12	0	30		4.0M					500M	T
2N3984	S	N			AH	0.2W	A	150	30	12	0	20		4.0M					400M	T
2N3985	S	N			AH	0.2W	A	150	30	12	0	20		4.0M					300M	T
2N3986	Thyristors, see Table on Page 2-70																			
2N3992	Field-Effect Transistors, see Table on Page 2-81																			
2N3993	Field-Effect Transistors, see Table on Page 2-81																			
2N3994	Field-Effect Transistors, see Table on Page 2-81																			
2N3995	G	P	2N2929	2N2929	AH	0.3W	A	100	20	12	0	40	200	2.0M			150	E	0.6G	T
2N3996	S	N	2N5346	2N5346	SHP	2.0W	A	200	100	80	0	40	120	1.0A	0.25	1.0A			40M	T
2N3997	S	N	2N5346	2N5346	SHP	2.0W	A	200	100	80	0	80	240	1.0A	0.25	1.0A			40M	T
2N3998	S	N	2N5477	2N5346	SHP	2.0W	A	200	100	80	0	40	120	1.0A	0.25	1.0A			40M	T
2N3999	S	N	2N5478	2N5346	SHP	2.0W	A	200	100	80	0	80	240	1.0A	0.25	1.0A			40M	T
2N4000	S	N	2N3019	2N3019	SHP	1.0W	A	200	100	80	0	30	120	0.5A	0.3	0.5A			40M	T
2N4001	S	N	2N3500	2N3498	SHP	1.0W	A	200	120	100	0	40	120	0.5A	0.3	0.5A			40M	T
2N4002	S	N	MJ7000	MJ7000	AP	4.0W	A	100	80	0	20	80	15A				30	E	30M	B
2N4003	S	N	MJ7000	MJ7000	AP	4.0W	A	120	100	0	20	80	15A				30	E	30M	B
2N4004	S	N			AP	1.2W	A	100	80	0	30	150	10A						30M	B
2N4005	S	N			AP	1.2W	A	120	100	0	30	150	10A						30M	B
2N4006	S	P			A	400M	A	200	10	6.0	0						40	E	20M	T
2N4007	S	P			S	400M	A	200	20	15	0						30	E	15M	T
2N4008	S	P			S	400M	A	200	35	30	0						20	E	15M	T
2N4009	Matched Pair 2N4006																			
2N4010	Matched Pair 2N4007																			
2N4011	Matched Pair 2N4008																			
2N4012	S	N		2N4012	AP	11.6W	C	200	65	40	0	4.0	40	1.0A	1.0	0.25A			400M	T
2N4013	S	N			SH	360M	A	200	60	40	0		150	100M					300M	T
2N4014	S	N			SH	360M	A	200	80	50	0		150	100M					300M	T
2N4015	S	P		2N4015	AM	0.4W	A	200	60	60	0	135	350	1.0M	0.25	50M	135	E	200M	T
2N4016	S	P		2N4015	AM	0.4W	A	200	60	60	0	135	350	1.0M	0.25	50M	135	E	200M	T
2N4017	S	P			A	600M	A	200	80	80	0	100	500	1.0M					40M	T
2N4018	S	P			A	400M	A	200	60	60	0						100	E	7.0M	E
2N4019	S	P			A	400M	A	200	45	45	0						250	E	50M	T
2N4020	S	P			AM	0.4W	A	200	45	45	0	250	500	10*	0.25	10M	250	E	50M	T
2N4021	S	P			AM	0.4W	A	200	60	60	0	100	350	10*	0.25	10M	100	E	40M	T
2N4022	S	P			AM	0.4W	A	200	60	60	0	250	500	10*	0.25	10M	250	E	50M	T
2N4023	S	P			AM	0.4W	A	200	45	45	0	250	500	10*	0.25	10M	250	E	50M	T
2N4024	S	P			AM	0.4W	A	200	60	60	0	100	350	10*	0.25	10M	100	E	40M	T
2N4025	S	P			AM	0.4W	A	200	60	60	0	250	500	10*	0.25	10M	250	E	50M	T
2N4026	S	P			A	0.5W	A	200	60	60	0	40	120	0.1A	1.0	1.0A			100M	T
2N4027	S	P			A	0.5W	A	200	80	80	0	40	120	0.1A	0.5	0.5A			100M	T
2N4028	S	P			A	0.5W	A	200	60	60	0	100	300	0.1A	1.0	1.0A			150M	T
2N4029	S	P			A	0.5W	A	200	80	80	0	100	300	0.1A	0.5	0.5A			150M	T
2N4030	S	P			A	0.8W	A	200	60	60	0	40	120	0.1A	1.0	1.0A			100M	T
2N4031	S	P			A	0.8W	A	200	80	80	0	40	120	0.1A	0.5	0.5A			100M	T
2N4032	S	P			A	0.8W	A	200	60	60	0	100	300	0.1A	1.0	1.0A			150M	T
2N4033	S	P			A	0.8W	A	200	80	80	0	100	300	0.1A	0.5	0.5A			150M	T
2N4034	S	P			SH	0.36W	A	200	40	40	0	70	200	10M	0.13	1.0M	50	E	400M	T
2N4035	S	P			SH	0.36W	A	200	40	40	0	150	300	10M	0.13	1.0M	150	E	450M	T
2N4036	S	P	MM4036		S	7.0W	A	200	90	65	0	40	140	0.15A					60M	T
2N4037	S	P	MM4037		S	1.0W	A	200	60	40	0	50	250	0.15A					60M	T
2N4038	Field-Effect Transistors, see Table on Page 2-81																			
2N4039	S	N			AHP	17.5W	C	200	60	40	0	10	80	0.1A	2.0	1.0A			400M	T
2N4040	S	N			AHP	10W	C	200	60	40	0	10	80	75M	2.0	0.5A			400M	T
2N4041	S	N			AM	0.3W	C	200	60	60	0	200	600	10*	0.35	1.0M			200M	T
2N4042	S	N			AM	0.3W	C	200	45	45	0	80	800	10*	0.35	1.0M			150M	T
2N4043	S	N			AM	0.3W	C	200	45	45	0	80	800	10*	0.35	1.0M			150M	T
2N4044	S	N			AM	0.4W	C	200	60	60	0	200	600	10*	0.35	1.0M			200M	T
2N4045	S	N			AM	0.4W	C	200	45	45	0	80	800	10*	0.35	1.0M			150M	T
2N4046	S	N	2N3052	2N3052	SH	800M	A	200	50	30	0	150	100M						250M	T
2N4047	S	N	2N2193	2N2192	SH	800M	A	200	80	50	0		150	100M					250M	T
2N4048	G	P			AP	170W	C	110	45	30	0	60	180	15A	0.30	60A			2.0K	E
2N4049	G	P			AP	170W	C	110	60	45	0	60	180	15A	0.30	60A			2.0K	E
2N4050	G	P			AP	170W	C	110	75	60	0	60	180	15A	0.30	60A			2.0K	E
2N4051	G	P			AP	170W	C	110	45	30	0	80	240	15A	0.30	60A			2.0K	E
2N4052	G	P			AP	170W	C	110	60	45	0	80	240	15A	0.30	60A			2.0K	E
2N4053	G	P			AP	170W	C	110	75	60	0	80	240	15A	0.30	60A			2.0K	E
2N4054	S	N	MJ400	MJ400	AP	6.25W	C	150	300	300	0	30	90	50M	5.0	75M			15M	T
2N4055	S	N	MJ400	MJ400	AP	6.25W	C	150	250	250	0	30	90	50M	5.0	75M			15M	T
2N4056	S	N	MJ400	MJ400	AP	6.25W	C	150	200	200	0	30	90	50M	5.0	75M			15M	T
2N4057	S	N	MJ400	MJ400	AP	6.25W	C	150	150	150	0	30	90	50M	5.0	75M			15M	T
2N4058	S	P	MP86522	MP86516	A	0.25W	A	150	30	30	0	100	400	0.1M	0.7	10M				
2N4059	S	P	MP86516	MP86516	A	0.25W	A	150	30	30	0	45	660	1.0M	0.7	10M	45	E		



## 2N4060-2N4227

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript	
2N4060	S	P	MPS6516	MPS6516	A	0.25W	A	150	30	30	0	45	165	1.0M	0.7	10M	45	E		
2N4061	S	P	MPS6517	MPS6516	A	0.25W	A	150	30	30	0	90	330	1.0M	0.7	10M	90	E		
2N4062	S	P	MPS6518	MPS6516	A	0.25W	A	150	30	30	0	180	660	1.0M	0.7	10M	180	E		
2N4063	S	N	2N3439	2N3439	AP	10W	C	200	450	350	0	40	160	0.02A					15M	E
2N4064	S	N	2N3440	2N3439	AP	10W	C	200	300	250	0	40	160	0.02A					15M	E
2N4065	Field-Effect Transistors, see Table on Page 2-81																			
2N4067	S	N			AH	500M	A	175	150	150	0	30		30M					50M	T
2N4069	S	N			AP	1.0W	C	175	150	150	0	30		0.03A	0.68				50M	T
2N4070	S	N	2N3448	2N3445	AP	115W	C	200	100	80	0	40	120	5.0A	1.5	5.0A	40	E	10M	T
2N4072	S	N			AHP	1.5W	C	200	40	20	0	10		25A				550M	T	
2N4073	S	N			AHP	1.5W	C	200	40	20	0	10		25A				550M	T	
2N4074	S	N			AH	400M	A	175	40	40	0	30					400	E	30M	T
2N4075	S	N	2N3764	2N3762	AP	30W	C	200		80	0	50	150						30M	T
2N4076	S	N			AP	30W	C	200		15	0	20		3.0M					1.0G	T
2N4080	S	P			AHP	300M	A	200	20	40	0	40	180	2.0M			40	E	600M	T
2N4081	S	N			AH	200M	A		40	40	0	40	180	2.0M						
2N4082	Field-Effect Transistors, see Table on Page 2-81																			
2N4085	S	N	MPS6514	MPS6512	A	200M	A		12	12	0	150	300	2.0M			150	E		
2N4086	S	N	MPS6515	MPS6512	A	200M	A		12	12	0	250	500	2.0M			250	E		
2N4087	S	N	MPS6515	MPS6512	A	200M	A		12	12	0	250	500	2.0M			250	E		
2N4087A	S	N	MPS6515	MPS6512	A	200M	A		12	12	0	250	500	2.0M						
2N4088	Field-Effect Transistors, see Table on Page 2-81																			
2N4095	Field-Effect Transistors, see Table on Page 2-81																			
2N4096	Thyristors, see Table on Page 2-70																			
2N4098	S	N			AM	300M	A	200	55	55	0	175		1.0M					150M	T
2N4099	S	N			AM	400M	A	200	55	55	0	175		1.0M					150M	T
2N4100	Thyristors, see Table on Page 2-70																			
2N4101	S	N			AH	300M	A	175	60	60	0						1400	E	540M	T
2N4103	G	P	MP2060	MPS2060	A	1.6W	A		25			70	350	5.0M						
2N4106	Thyristors, see Table on Page 2-70																			
2N4108	Thyristors, see Table on Page 2-70																			
2N4110	Thyristors, see Table on Page 2-70																			
2N4111	S	N	2N5428	2N5427	AP	30W	C		100	60	0	40	120	2.0A					70M	T
2N4112	S	N			AP	30W	C		100	60	0	100	300	2.0A					80M	T
2N4113	S	N	2N5428	2N5427	AP	30W	C		120	80	0	40	120	2.0A					70M	T
2N4114	S	N			AP	3.0W	A		120	80	0	100	300	2.0A					80M	E
2N4115	S	N	2N5428	2N5427	AP	37W	C		120	80	0	40	120	2.0A					70M	E
2N4116	S	N			AP	37W	C		120	80	0	100	300	2.0A					80M	E
2N4117A	Field-Effect Transistors, see Table on Page 2-81																			
2N4120A	S	P	2N3905	2N3905	AH	200M	A	125	40	40	0	70		10M			50	E	400M	T
2N4121	S	P	2N3905	2N3905	AH	200M	A	125	40	40	0	70		10M			50	E	400M	T
2N4122	S	P	2N3906	2N3905	AH	200M	A	125	40	40	0	150		10M			150	E	450M	T
2N4123	S	N			SH	310M	A	135	40	30	0	50	150	2.0M	0.3	50M	50	E	250M	T
2N4124	S	N			SH	310M	A	135	30	25	0	120	360	2.0M	0.3	50M	120	E	300M	T
2N4125	S	P			SH	310M	A	135	30	30	0	50	150	2.0M	0.4	50M	50	E	200M	T
2N4126	S	P			SH	310M	A	135	25	25	0	120	360	2.0M	0.4	50M	120	E	250M	T
2N4127	S	N			AP	25W	C		60	40	0	10	80	0.2A					300M	T
2N4128	S	N			AP	40W	C		60	40	0	10	80	0.2A					200M	T
2N4130	S	N			AP	120W	C		80	65	0	10	60	2.0A					1.25M	E
2N4131	S	N			AP	60W	C		90	80	0	10	80	1.0A					150M	E
2N4132	S	N			AHP	7.5W	C	175	90	80	0	10	80	0.2A	0.5	0.6A			200M	T
2N4133	S	N			AHP	3.0W	C	175	90	80	0	10	80	0.2A	0.5	0.6A			200M	T
2N4134	S	N			AH	200M	A	200	30	30	0						200	E	350M	T
2N4135	S	N			AH	200M	A	200	30	30	0						200	E	425M	T
2N4136	Pair of 2N2430 and 2N2431																			
2N4137	S	N			SP	360M	A	200	40	40	0	40	120	10M					500M	T
2N4138	S	N			SC	300M	A	200	30	30	0	50		1.0M					20M	T
2N4139	Field-Effect Transistors, see Table on Page 2-81																			
2N4140	S	N	2N4400	2N4400	AH	300M	A	125	60	30	0		120	150M					250M	T
2N4141	S	N	2N4401	2N4400	AH	300M	A	125	60	30	0		300	150M					250M	T
2N4142	S	P	2N4402	2N4402	AH	300M	A	125	60	40	0		120	150M					200M	T
2N4143	S	P	2N4403	2N4402	AH	300M	A	125	60	40	0		300	150M					200M	T
2N4144	Thyristors, see Table on Page 2-70																			
2N4149	S	N	2N5337	2N5336	AP	5W	C		100	80	0	40	120	5.0A					15M	T
2N4150	Thyristors, see Table on Page 2-70																			
2N4151	Thyristors, see Table on Page 2-70																			
2N4204	S	P			SH	300M	A	200	6.0	6.0	0	50	120	10M					650M	T
2N4207	S	P			SH	300M	A	200	12	12	0	30	120	10M					700M	T
2N4208	S	P			SH	300M	A	200	15	15	0	50	120	10M					850M	T
2N4209	S	N	MJ7000	MJ7000	AP	100W	C		80	60	0	20	100	10A					10M	T
2N4210	S	N	MJ7000	MJ7000	AP	100W	C		100	80	0	20	100	10A					10M	T
2N4211	S	N	MJ7000	MJ7000	AP	100W	C													
2N4212	Thyristors, see Table on Page 2-70																			
2N4219	Field-Effect Transistors, see Table on Page 2-81																			
2N4220A	Field-Effect Transistors, see Table on Page 2-81																			
2N4224A	S	N	2N5334	2N5334	AP	5.0W	C		100	40	0	40	150	1.0A					150M	T
2N4225	S	N	2N5334	2N5334	AP	5.0W	C		200	60	0	40	150	1.0A					150M	T
2N4226	S	N	2N5334	2N5334	S	300M	A	125	60	30	0		150	150M					250M	T
2N4227	S	N	2N4400	2N4400	S	300M	A													



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript					
						@ 25°C	°C	(volts)	(volts)	(volts)							(min)	(max)	Units	(volts)	Units
2N4228	S	P	2N4202	2N4202	AH	300M	A	125	60	40	0	150	150M	0.7	1.5A	20	E	200M	T		
2N4231	S	N	2N4231	2N4231	AP	35W	C	200	40	40	0	25	100	1.5A	0.7	1.5A			1.0M	T	
2N4231A	S	N			AP	75W	C	200	40	40	0	25	100	1.5A	0.7	1.5A			4.0M	T	
2N4232	S	N	2N4232	2N4231	AP	35W	C	200	60	60	0	25	100	1.5A	0.7	1.5A			1.0M	T	
2N4232A	S	N			AP	75W	C	200	60	60	0	25	100	1.5A	0.7	1.5A			4.0M	T	
2N4233	S	N	2N4233	2N4231	AP	35W	C	200	80	80	0	25	100	1.5A	0.7	1.5A	20	E	1.0M	T	
2N4233A	S	N			AP	75W	C	200	80	80	0	25	100	1.5A	0.7	1.5A			4.0M	T	
2N4234	S	P	2N4234	2N4234	SP	1.0W	A	200	40	40	0	30	150	250M	0.6	1.0A			3.0M	T	
2N4235	S	P	2N4235	2N4234	SP	1.0W	A	200	60	60	0	30	150	250M	0.6	1.0A			3.0M	T	
2N4236	S	P	2N4236	2N4234	SP	1.0W	A	200	80	80	0	30	150	250M	0.6	1.0A			3.0M	T	
2N4237	S	N	2N4237	2N4237	AP	5.0W	C	175	50	40	0	40	160	500M	2.5	1.0A	40	E	10M	T	
2N4238	S	N	2N4238	2N4237	AP	5.0W	C	175	80	60	0	40	160	500M	2.5	1.0A	40	E	2.0M	T	
2N4239	S	N	2N4239	2N4237	AP	5.0W	C	175	100	60	0	40	160	500M	2.5	1.0A	40	E	2.0M	T	
2N4240	S	P	2N4240		A	35W	C	440	300	30	240	0.75A						2.0M	T		
2N4241	G	P			AP	37.5W	C	32	20	0	60	300M		0.35	5.0A					T	
2N4242	G	P			AP	105W	A	80	60	0	40	80	5.0A					500K		T	
2N4243	G	P			AP	105W	A	60	45	0	40	80	5.0A					500K		T	
2N4244	G	P			AP	105W	A	80	60	0	40	80	5.0A					500K		T	
2N4245	G	P			AP	105W	A	60	60	0	60	120	5.0A					500K		T	
2N4246	G	P			AP	105W	A	60	45	0	60	120	5.0A					500K		T	
2N4247	G	P			AP	105W	A	40	30	0	60	120	5.0A					500K		T	
2N4248	S	P	2N5086	2N5086	A	200M	A	125	40	40	0					50	E	40M	T		
2N4249	S	P	2N5086	2N5086	A	200M	A	125	60	60	0					100	E	40M	T		
2N4250	S	P	2N5087	2N5086	A	200M	A	125	40	40	0					250	E	40M	T		
2N4251	S	N			S	250M	A	200	15	10	0	100	10M					1300M	T		
2N4252	S	N			AH	200M	A	175	30	18	0	50	2.0M					600M	T		
2N4253	S	N			AH	200M	A	175	30	18	0	30	2.0M					600M	T		
2N4254	S	N	MPS6547	MPS6546	A	200M	A	175	30	18	0	50	2.0M							T	
2N4255	S	N	MPS6547	MPS6546	A	200M	A	175	30	18	0	30	2.0M							T	
2N4256	S	N	2N3904	2N3903	A	200M	A	30	30	30	S									T	
2N4257	S	P			SH	200M	A	125	6.0	6.0	0	30	120	10M	0.15	10M			500M	T	
2N4275A	S	P			SH	0.5W	C	125	6.0	6.0	0	30	120	10M					500M	T	
2N4258	S	P			SH	200M	A	125	12	12	0	30	120	10M	0.15	10M			700M	T	
2N4258A	S	P			SH	0.5W	C	125	12	12	0	30	120	10M					500M	T	
2N4259	S	N			AH	175M	A	175	40	30	0					70	E	1500M	T		
2N4260	S	P			SH	200M	A	200	15	15	0	30	150	10M	0.15	15A	16	E	2000M	T	
2N4261	S	P	2N4260	2N4260	SH	200M	A	200	5.0	15	0	30	150	15A	0.15	15A	20	E	600M	T	
2N4262	S	N			AP	1.5W	C	25	10	75	0	75	0.3A					800M	T		
2N4263	S	N			AP	1.5W	C	25	10	75	0	75	0.3A					300M	T		
2N4264	S	P			S	310M	A	135	30	15	0	40	160	10M	0.22	10M			300M	T	
2N4265	S	N	2N4264	2N4264	SH	310M	A	135	30	12	0	100	400	15A					300M	T	
2N4267	Field-Effect Transistors, see Table on Page 2-81																				
2N4269	S	N			A	360M	A	200	200	140	0	200	10M								
2N4270	S	N			A	580M	A	200	200	140	0	200	10M								
2N4271	S	N	2N5682	2N5681	AP	5.0W	C	175	140	0	20	140	0.2A					20M	T		
2N4272	S	N	2N5682	2N5681	AP	5.0W	C	175	140	0	20	140	1.0A					10M	T		
2N4273	S	N			AP	25W	C	175	140	0	20	140	1.0A					10M	T		
2N4274	S	N			SH	280M	A	125	30	12	0	18	100M					400M	T		
2N4275	S	N			SH	280M	A	125	40	15	0	18	100M					400M	T		
2N4276	G	P	2N4276	2N4276	AP	170W	C	110	30	20	0	60	180	15A	0.15	15A			2.0K	E	
2N4277	G	P	2N4276	2N4276	AP	170W	C	110	30	20	0	80	240	15A	0.15	15A			2.0K	E	
2N4278	G	P	2N4276	2N4276	AP	170W	C	110	45	30	0	60	180	15A	0.15	15A			2.0K	E	
2N4279	G	P			AP	170W	C	110	45	30	0	80	240	15A	0.15	15A			2.0K	E	
2N4280	G	P			AP	170W	C	110	60	45	0	60	180	15A	0.15	15A			2.0K	E	
2N4281	G	P			AP	170W	C	110	60	45	0	80	240	15A	0.15	15A			2.0K	E	
2N4282	G	P			AP	170W	C	110	75	60	0	60	180	15A	0.15	15A			2.0K	E	
2N4283	G	P			AP	170W	C	110	75	60	0	80	240	15A	0.15	15A			2.0K	E	
2N4284	S	P			A	250M	A	165	25	25	0	600	1.0M								
2N4285	S	P			A	250M	A	165	35	35	0	600	1.0M								
2N4286	S	N	MPS6515		A	250M	A	150	30	25	0					600	E	40M	T		
2N4287	S	N	MPS6566		A	250M	A	150	45	45	0					600	E	40M	T		
2N4288	S	P	MPS6518	MPS6516	A	250M	A	150	30	25	0					600	E	40M	T		
2N4289	S	P	2N5086		A	250M	A	150	60	45	0					600	E	40M	T		
2N4290	S	P	MPS6533	MPS6530	A	250M	A	150	30	20	0					600	E	40M	T		
2N4291	S	P	MPS6534	MPS6530	A	250M	A	150	40	30	0					600	E	40M	T		
2N4292	S	N	MPS918	MPS918	A	200M	A	150	30	15	0	20	3.0M					600M	T		
2N4293	S	N	MPS918	MPS918	A	200M	A	150	30	15	0					60	E	600M	T		
2N4294	S	N	2N4264	2N4264	SH	200M	A	150	30	12	0	30	120	10M				400M	T		
2N4295	S	N	2N4264	2N4264	SH	200M	A	150	40	15	0	40	120	10M				500M	T		
2N4296	S	N	2N3738	2N3738	SP	20W	C	350	250	0	50	150	0.05A					20M	T		
2N4297	S	N	2N3738	2N3738	AP	20W	C	350	250	0	75	300	0.05A					20M	T		
2N4298	S	N	2N3739	2N3739	AP	20W	C	500	350	0	25	75	0.05A					20M	T		
2N4299	S	N	2N3739	2N3739	AP	20W	C	500	350	0	50	150	0.05A					20M	T		
2N4300	S	N	2N5336	2N5336	AP	15W	C	100	80	0	30	120	1.0A					30M	T		
2N4301	S	N	2N5477	2N5477	AP	50W	C	100	80	0	30	120	5.0A					40M	T		
2N4302	Field-Effect Transistors, see Table on Page 2-81																				
2N4305	S	N	2N5337	2N5336	AP	1.5W	A	120	80	0	50	150	1.0A								
2N4306	S	N			AP	4.0W	A	120	80	0	50	150	1.0A								
2N4307	S	N	2N5337	2N5336	AP	1.5W	A	100	60	0	50	150	1.0A								
2N4308	S	N			AP	4.0W	A	100	60	0	50	150	1.0A								



**2N4338-2N4450**

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS															
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript								
						@ 25°C	°C	(volts)	(volts)	Subscript	(min)	(max)	Units	(volts)	Units	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Units	Subscript						
2N4338 thru 2N4343	Field-Effect Transistors, see Table on Page 2-81																									
2N4346	S	N	2N4347		AP	5.0W	A		140	120	0	15	60	2.0A												
2N4347	S	N	2N4348		AP	100W	C		140	120	0	15	60	5.0A												
2N4348	S	N			AP	120W	C		65	40	0	10	200	0.35A				300M	T							
2N4350	S	N			AP	7.0W	C																			
2N4351	Field-Effect Transistors, see Table on Page 2-81																									
2N4352	S	P			A	350M	A	125	80	80	0	25		0.1M				500M	T							
2N4353	S	P			A	350M	A	125	60	60	0	60		0.1M				500M	T							
2N4354	S	P			A	350M	A	125	60	60	0	60		0.1M												
2N4355	S	P			A	350M	A	125	60	60	0	60		0.1M												
2N4356	S	P			A	350M	A	125	80	80	0	25		0.1M				500M	T							
2N4357	S	P			A	400M	A	200	240	240	0	80		10M	0.5	10M	100	E	40M							
2N4358	S	P			A	400M	A	200	240	240	0	80		10M	0.5	10M	100	E	40M							
2N4359	S	P			A	360M	A	200	45	45	0	50	600	1.0M	0.25	10M	50	E								
2N4360	Field-Effect Transistors, see Table on Page 2-81																									
2N4361	Thyristors, see Table on Page 2-70																									
2N4380	Field-Effect Transistors, see Table on Page 2-81																									
2N4381	Field-Effect Transistors, see Table on Page 2-81																									
2N4382	S	N			AH	800M	A	200	40	30	0						1000	E	120M							
2N4383	S	N			AH	500M	A	200	40	30	0						1000	E	120M							
2N4384	S	N			AH	800M	A	200	40	30	0						1000	E	120M							
2N4385	S	N			AH	500M	A	200	40	30	0						1000	E	120M							
2N4386	S	P	2N3740	2N3740	AH	20W	A	200	40	0	0	25	100	500M												
2N4387	S	P	2N3740	2N3740	AH	20W	A	200	40	0	0	25	100	500M												
2N4388	S	P			SH	200M	A	125	12	12	0	30	180	10M	0.15	10M	4.0	E	50M							
2N4389	S	P			SH	500M	A	175	120	120	0	20		2.0M												
2N4390	S	N			S																					
2N4391	Field-Effect Transistors, see Table on Page 2-81																									
2N4393	S	N	2N3715	2N3713	AP	62.5W	C		60	40	0	50	170	2.0A				4M	T							
2N4395	S	N	2N3715	2N3713	AP	62.5W	C		80	60	0	40	170	2.0A				4M	T							
2N4396	S	N			AM	200M	A		40	40	0	40	180	2.0M			40	E	600M							
2N4397	S	N																								
2N4398	S	P	2N4398	2N4398	AP	200W	C	200	40	40	0	15	60	15A	1.0	15A	40	E	4M							
2N4399	S	P	2N4399	2N4398	AP	200W	C	200	60	60	0	15	60	15A	1.0	15A	40	E	4M							
2N4400	S	N			SH	310M	A	135	60	40	0	50	150	150M	0.4	150M	20	E	200M							
2N4401	S	N			SH	310M	A	135	60	40	0	100	300	150M	0.4	150M	40	E	250M							
2N4402	S	P			SH	310M	A	135	40	40	0	50	150	150M	0.4	150M	30	E	150M							
2N4403	S	P			SH	310M	A	135	40	40	0	100	300	150M	0.4	150M	60	E	200M							
2N4404	S	P			A	5.0W	C		80	80	0	40	120	150M	0.15	10M			200M							
2N4405	S	P			A	5.0W	C		80	80	0	100	300	150M	0.15	10M			200M							
2N4406	S	P			A	5.0W	C		80	80	0	30	120	500M	0.2	150M			150M							
2N4407	S	P			A	5.0W	C		80	80	0	80	240	500M	0.2	150M			150M							
2N4409	S	N			S	310M	A	135	80	50	0	60	400	1.0M	0.2	1.0M										
2N4410	S	N			S	310M	A	135	120	80	0	60	400	1.0M	0.2	1.0M										
2N4411	S	P			S	150M	A	200	15	12	0	40		0.5M				400M	T							
2N4412	S	N			AH	600M	A	200	40	30	0						1000	E	100M							
2N4412A	S	P			AH	600M	A	200	60	60	0						120	E	20M							
2N4413	S	P			AH	400M	A	200	40	30	0						1000	E	100M							
2N4413A	S	P			AH	400M	A	200	60	60	0						120	E	20M							
2N4414	S	P			AH	600M	A	200	40	30	0						1000	E	100M							
2N4414A	S	P			AH	600M	A	200	60	60	0						100	E	20M							
2N4415	S	P			AH	400M	A	200	40	30	0						1000	E	100M							
2N4415A	S	P			AH	400M	A	200	60	60	0						100	E	20M							
2N4416	Field-Effect Transistors, see Table on Page 2-81																									
2N4416A	Field-Effect Transistors, see Table on Page 2-81																									
2N4417	Field-Effect Transistors, see Table on Page 2-81																									
2N4418	S	N	2N4264	2N4264	S	250M	A	125	40	40	S	40	120	10M				500M	T							
2N4419	S	N	2N4264	2N4264	S	250M	A	125	30	30	S	30	30	10M				400M	T							
2N4420	S	N	MPS3646	MPS3646	S	250M	A	125	40	40	S	30	120	30M				350M	T							
2N4421	S	N	MPS3646	MPS3646	S	250M	A	125	30	30	S	25	30	30M				300M	T							
2N4422	S	N	MPS3646	MPS3646	S	250M	A	125	40	40	S	30	120	30M				350M	T							
2N4423	S	N	MPS3640	MPS3646	S	250M	A	125	12	12	S	40	150	30M				400M	T							
2N4424	S	N	MPS3711	MP3707	S	360M	A	150	40	40	0						180	E								
2N4425	S	N			S	560M	A	150	40	40	0	180		2M												
2N4427	S	N			AP	3.5W	C		40	20	0	10	200	0.1A				500M	T							
2N4428	S	N			AP	3.5W	C		55	35	0	20	200	0.05A				700M	T							
2N4429	S	N			AP	5.0W	C		55	35	0	20	200	0.05A				700M	T							
2N4430	S	N			AP	10W	C		55	40	0	20	200	0.1A				600M	T							
2N4431	S	N			AP	18W	C		55	40	0	20	200	0.1A				600M	T							
2N4432	S	N			AH	600M	A		50	30	0	40	130	6.0M												
2N4432A	S	N			AH	600M	A		50	30	0	80	150	6.0M												
2N4436	S	N			AHP	200M	A	125	60	30	0	40	120	150M	0.22	150M	45	E	250M							
2N4437	S	N			AHP	200M	A	125	60	30	0	100	300	150M	0.22	150M	90	E	250M							
2N4438	S	N			A	1.0W	A	200	300	300	0	40	120	50M	1.0	100M			30M							
2N4439	S	N			A	1.0W	A	200	300	300	0	100	240	50M	1.0	100M			30M							
2N4440	S	N			AP	11.6W	C		65	40	0	10	200	0.125A				400M	T							
2N4441	Thyristors, see Table on Page 2-70																									
2N4444	Field-Effect Transistors, see Table on Page 2-81																									
2N4445	S	N			SH	0.3W	A		40	40	0	40		10M	0.18	10M			500M							
2N4448	S	N			SH	0.3W	C	200	60	30	0	75		10M	0.22	150M			250M							



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub>	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>		Subscript		
						@ 25°C	°C	(volts)	(volts)		(min)	(max)	Units	(volts)	Units		Units	Units		Units	
2N4451	S	P	2N3716	2N3713	S	0.3W	A	200	45	12	0	40	30M	0.25	30M	135	E	400M	T		
2N4452	S	P			S	0.35W	A	200	45	15	0	115	50M	0.4	15M	200	E	200M	T		
2N4453	S	P			S	0.3W	A	200	100	18	0	40	30M	0.25	30M	25	E	400M	T		
2N4576	S	N			AHP	150W	C	200	100	80	0	50	1.0A	0.8	5.0A	25	E	30K	E		
2N4851	Unijunction Transistors, see Table on Page 2-88																				
2N4853	Complementary Pair					SH	300M	A	200	60	40	0	50	1.0M			200M	T			
2N4854						SH	300M	A	200	60	40	0	25	1.0M			200M	T			
2N4855	Field-Effect Transistors, see Table on Page																				
2N4856																					
2N4861																					
2N4862	S	N			AP			200	140	120	0	50	150	0.5A	0.2	0.5A	50	E	50M	T	
2N4863	S	N			AP			200	140	120	0	50	150	0.5A	0.2	0.5A	50	E	50M	T	
2N4864	S	N			AP			200	140	120	0	50	150	0.5A	0.2	0.5A	50	E	50M	T	
2N4865	S	N			SP	350W	C	200	100	80	0	10	40	70A	1.5	50A			10M	T	
2N4866	S	N			SP	350W	C	200	140	120	0	10	40	70A	1.5	50A			10M	T	
2N4867	Field-Effect Transistors, see Table on Page 2-81																				
2N4869																					
2N4870	Unijunction Transistors, see Table on Page 2-88																				
2N4871	S	P	2N4877	2N4877	SH	700M	C	200	12	12	0	50	120	10M	0.13	1.0M	9.0	E			
2N4872	S	P			SH	360M	C	200	40	15	0	110	150	10M	0.2	1.0M	7.0	E			
2N4873	S	N																			
2N4874	S	N			AH	720M	A	175	30	20	0							200	E	900M	T
2N4875	S	N			AH	720M	A	175	40	25	0							200	E	800M	T
2N4876	S	N	2N4877	2N4877	AH	720M	A	175	40	30	0						200	E	650M	T	
2N4877	S	N			AP	10W	C	200	60	60	0	20	100	4.0A	1.0	4.0A			4.0M	T	
2N4878	S	N			AM	300M	C		60	60	0	200	600	10*	0.35	1.0M			200M	T	
2N4879	S	N			AM	300M	C		55	55	0	150	600	10*	0.35	1.0M			150M	T	
2N4880	S	N			AM	300M	C		45	45	0	80	800	10*	0.35	1.0M			150M	T	
2N4881	Field-Effect Transistors, see Table on Page 2-81																				
2N4886																					
2N4888	S	P			A	300M	A	125	150	150	0	40	400	10M	0.5	10M			30M	T	
2N4889	S	P			A	300M	A	125	150	150	0	80	300	10M	0.5	10M			40M	T	
2N4890	S	P			S	1.0W	A		60	40	0	50	250	150M	1.4	150M	5.0	E			
2N4891	Unijunction Transistors, see Table on Page 2-88																				
2N4894																					
2N4895	S	N	2N4337		SP	4.0W	C	200	120	60	0	40	120	2.0A	1.0	5.0A	2.5	E			
2N4896	S	N			SP	4.0W	C	200	120	60	0	100	300	2.0A	1.0	5.0A	4.0	E			
2N4897	S	N			SP	4.0W	C	200	150	80	0	40	120	2.0A	1.0	5.0A	2.5	E			
2N4898	S	P			AP	2.5W	C	200	40	40	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4899	S	P			AP	2.5W	C	200	60	60	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4900	S	P	2N4901	2N4901	AP	2.5W	C	200	80	80	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4901	S	P			AP	87.5W	C	200	40	40	0	20	80	1.0A	0.4	1.0A	20	E	4.0M	T	
2N4902	S	P			AP	87.5W	C	200	60	60	0	20	80	1.0A	0.4	1.0A	20	E	4.0M	T	
2N4903	S	P			AP	87.5W	C	200	80	80	0	25	100	2.5A	1.0	2.5A	40	E	4.0M	T	
2N4904	S	P			AP	87.5W	C	200	40	40	0	25	100	2.5A	1.0	2.5A	40	E	4.0M	T	
2N4905	S	P	2N4906	2N4906	AP	87.5W	C	200	80	80	0	25	100	2.5A	1.0	2.5A	40	E	4.0M	T	
2N4906	S	P			AP	150W	C	200	40	40	0	20	80	4.0A	0.75	4.0A			4.0M	T	
2N4907	S	P			AP	150W	C	200	60	60	0	20	80	4.0A	0.75	4.0A			4.0M	T	
2N4908	S	P			AP	150W	C	200	80	80	0	20	80	4.0A	0.75	4.0A			4.0M	T	
2N4909	S	P			AP	150W	C	200	80	80	0	20	80	4.0A	0.75	4.0A			4.0M	T	
2N4910	S	N	2N4910	2N4910	AP	25W	C	200	40	40	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4911	S	N			AP	25W	C	200	60	60	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4912	S	N			AP	25W	C	200	80	80	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4913	S	N			AP	87.5W	C	200	40	40	0	25	100	2.5A	1.0	2.5A	20	E	4.0M	T	
2N4914	S	N			AP	87.5W	C	200	60	60	0	25	100	2.5A	1.0	2.5A	20	E	4.0M	T	
2N4915	S	N	2N4915	2N4913	AP	87.5W	C	200	80	80	0	25	100	2.5A	1.0	2.5A	20	E	4.0M	T	
2N4916	S	P			SH	500M	C	125	30	30	0	70	200	10M	0.14	10M			400M	T	
2N4917	S	P			SH	500M	C	125	30	30	0	150	300	10M	0.14	10M			450M	T	
2N4918	S	P			AP	30W	C	150	40	40	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4919	S	P			AP	30W	C	150	60	60	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4920	S	P	2N4920	2N4918	AP	30W	C	150	80	80	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4921	S	N			AP	30W	C	150	40	40	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4922	S	N			AP	30W	C	150	60	60	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4923	S	N			AP	30W	C	150	80	80	0	20	100	0.5A	0.6	1.0A	25	E	3.0M	T	
2N4924	S	N			AH	1.0W	A	175	100	100	0	40	200	150M	0.4	50M			100M	T	
2N4925	S	N	2N4926	2N4926	AH	1.0W	A	175	150	150	0	40	200	150M	0.4	50M			100M	T	
2N4926	S	N			AH	1.0W	A	175	200	200	0	20	200	30M	2.0	30M	25	E	300M	T	
2N4927	S	N			AH	1.0W	A	175	250	250	0	20	200	30M	2.0	30M	25	E	300M	T	
2N4928	S	P			A	3.0W	C		100	100	0	25	200	10M	0.5	10M			100M	T	
2N4929	S	P			A	5.0W	C		150	150	0	25	200	10M	0.5	10M			100M	T	
2N4930	S	P	2N5477	2N5477	A	5.0W	C		200	200	0	20	200	10M	5.0	10M			20M	T	
2N4931	S	P			AP	70W	C		250	250	0	20	200	10M	5.0	10M			20M	T	
2N4932	S	N			AP	70W	C		50	25	0	10	100	1.0A				100M	T		
2N4933	S	N			AP	70W	C		70	35	0	10	100	1.0A				100M	T		
2N4934	S	N			AH	200M	A		40	30	0	40	170	2.0M				700M	T		
2N4935	S	N	2N4937	2N4937	AH	200M	A		50	40	0	60	200	2.0M			70	E	700M	T	
2N4936	S	N			AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	
2N4937	S	P			AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	
2N4938	S	P			AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	
2N4939	S	P			AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	
2N4940	S	P	2N4937	2N4937	AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	
2N4941	S	P			AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	
2N4942	S	P			AM	600M	A	200	50	40	0	50	250	1.0M			50	E	300M	T	



**2N4943-2N5041**

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>	V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript				
						@ 25°C	°C	(volts)	(volts)	(min)							(max)	Units	Units	Units
2N4943	S	N			AP	800M	A	120	80	0	100	300	150M	0.25	150M			45M	T	
2N4944	S	N			A	600M	C	125	80	40	40	100	150M	0.25	150M			60M	T	
2N4945	S	N			A	600M	C	125	80	60	40	100	150M	0.25	150M			60M	T	
2N4946	S	N			A	600M	C	125	80	40	0	100	300	150M	0.25	150M			60M	T
2N4947	Unijunction Transistors, see Table on Page 2-88																			
2N4948																				
2N4949	S	N	MJ7000	MJ7000	SP	300W	C	80	60	0	10	50A	1.5	50A			100K	T		
2N4950	S	N			A	360M	A	150	60	30	60	200	150M	0.3	150M			250M	T	
2N4951	S	N			A	360M	A	150	60	30	0	100	300	150M	0.3	150M			250M	T
2N4952	S	N			A	360M	A	150	60	30	0	200	600	150M	0.3	150M			250M	T
2N4953	S	N			A	360M	A	150	40	30	0	60	600	150M	0.3	150M			250M	T
2N4954	S	N			A	360M	A	150	40	30	0	60	600	150M	0.3	150M			250M	T
2N4955	S	N			AL	750M	C	125	30	25	0	60	600	10*	0.35	1.0M	150	E	60M	T
2N4956	S	N			AM	750M	C	125	30	25	0	60	600	10*	0.35	1.0M	150	E	60M	T
2N4957	S	P		2N4957	A	200M	A	200	30	30	0	20	40	2.0M					1200M	T
2N4958	S	P		2N4957	A	200M	A	200	30	30	0	20	40	2.0M					1000M	T
2N4959	S	P		2N4957	A	200M	A	200	30	30	0	20	40	2.0M					1000M	T
2N4960	S	N			A	800M	A	200	60	60	0	100	300	150M	0.7	10M			250M	T
2N4961	S	N			A	500M	A	200	80	80	0	100	300	150M	0.7	10M			250M	T
2N4962	S	N			A	800M	A	200	60	60	0	100	300	150M	0.7	10M			250M	T
2N4963	S	N			A	500M	A	200	80	80	0	100	300	150M	0.7	10M			250M	T
2N4964	S	P			A	200M	A	50	40	0	30	120	10*	0.4	10M					
2N4965	S	P			A	200M	A	50	40	0	80	400	10*	0.4	10M	100	E			
2N4966	S	N			A	200M	A	50	40	0	40	200	10*	0.4	10M	40	E			
2N4967	S	N			A	200M	A	50	40	0	100	600	10*	0.4	10M	100	E			
2N4968	S	N			A	200M	A	30	25	0	40	200	10*	0.4	10M	40	E			
2N4969	S	N			SH	200M	A	50	30	0	40	120	150M	0.4	150M				150M	T
2N4970	S	N			SH	200M	A	50	30	0	100	350	150M	0.4	150M					
2N4971	S	P			SH	200M	A	50	40	0	40	120	150M	0.4	150M					
2N4972	S	P			SH	200M	A	50	40	0	100	300	150M	0.4	150M					
2N4973	S	P			AL	200M	A	25	15	0	20		3.0M	0.5	10M					
2N4974	S	P		2N4974	AH	200M	A	15	10	0	30	90	5.0A	1.5	10A	20	E			
2N4975	S	P		2N4974	AL	800M	A	200	40	30	0	1000	4000	1.0*		15000	E		175M	T
2N4976	S	N			AHP	5, 0W	C	55	30	0	20	250	50M						175M	T
2N4977	Field-Effect Transistors, see Table on Page 2-81																			
2N4979																				
2N4980	S	P			SC	400M	A	30	30	0	60	300	1.0M						10M	T
2N4981	S	P			SC	400M	A	50	50	0	40	200	1.0M						5.0M	T
2N4982	S	P			SC	400M	A	70	70	0	30	150	1.0M						3.0M	T
2N4983	Thyristors, see Table on Page 2-70																			
2N4993																				
2N4994	S	N			AH	200M	A	60	45	0	40	160	10M							
2N4995	S	N			AH	200M	A	60	45	0	100	400	10M							
2N4996	S	N			AH	200M	A	30	18	0	50		2M							
2N4997	S	N			AH	200M	A	30	18	0	30	150	2M							
2N4998	S	N	2N5347	2N5346	AP	35W	C	200	100	80	0	30	90	1.0A	5.0	3.0A	20	E	50M	T
2N4999	S	P	2N6186	2N6186	AP	35W	C	200	100	80	0	30	90	1.0A	5.0	3.0A	20	E	50M	T
2N5000	S	N	2N5348	2N5346	AP	35W	C	200	100	80	0	70	200	1.0A	5.0	3.0A	50	E	60M	T
2N5001	S	P	2N6187	2N6186	AP	35W	C	200	100	80	0	70	200	1.0A	5.0	3.0A	50	E	60M	T
2N5002	S	N	2N5347	2N5346	AP	58W	C	200	100	80	0	30	90	2.5A	1.5	5.0A	20	E	60M	T
2N5003	S	P	2N6186	2N6186	AP	58W	C	200	100	80	0	30	90	2.5A	1.5	5.0A	20	E	60M	T
2N5004	S	N	2N5348	2N5346	AP	58W	C	200	100	80	0	70	200	2.5A	1.5	5.0A	50	E	70M	T
2N5005	S	P	2N6187	2N6186	AP	58W	C	200	100	80	0	70	200	2.5A	1.5	5.0A	50	E	70M	T
2N5006	S	N			AP	118W	C	200	100	80	0	30	90	5.0A	1.5	10A	20	E	30M	T
2N5007	S	P			AP	118W	C	200	100	80	0	30	90	5.0A	1.5	10A	20	E	30M	T
2N5008	S	N			AP	118W	C	200	100	80	0	70	200	5.0A	1.5	10A	50	E	40M	T
2N5009	S	P			AP	118W	C	200	100	80	0	70	200	5.0A	1.5	10A	50	E	40M	T
2N5010	S	N			A	2, 0W	C	500	500	R	30	180	25M	1.4	25M					
2N5011	S	N			A	2, 0W	C	600	600	R	30	180	25M	1.5	25M					
2N5012	S	N			A	2, 0W	C	700	700	R	30	180	25M	1.6	25M					
2N5013	S	N			A	2, 0W	C	800	800	R	30	180	20M	1.6	20M					
2N5014	S	N			A	2, 0W	C	900	900	R	30	180	20M	1.6	20M					
2N5015	S	N			A	2, 0W	C	1000	1000	R	30	180	20M	1.8	20M					
2N5016	S	N	2N5016	2N5016	AHP			65	30	0	10	200	0.5A						500M	T
2N5017	S	N			AHP			65	30	0	10	200	0.5A						500M	T
2N5018	Field-Effect Transistors, see Table on Page 2-81																			
2N5021																				
2N5022	S	P			SH	1, 0W	A	50	50	0	25	100	500M	0.2	100M					
2N5023	S	P			SH	1, 0W	A	30	30	0	40	100	500M	0.17	100M					
2N5024	S	N			SH	200M	A	20	10	0	25		10M							
2N5025	S	N			AHP	45W	C	300	75	0	20		2.0A	1.0	2.0A	13	E	1300M	T	
2N5026	S	N			AHP	45W	C	300	90	0	20		2.0A	1.0	2.0A					
2N5027	S	N			S	320M	A	120	30	0	50	150	150M	0.45	150M					
2N5028	S	N			S	320M	A	120	30	0	100	300	150M	0.45	150M					
2N5029	S	N			S	320M	A	120	15	0	40	120	10M	0.25	10M					
2N5030	S	N			S	320M	A	120	12	0	30		10M	0.25	10M					
2N5031	S	N		2N5031	AH	200M	A	15	10	0	25	300	1.0M							
2N5032	S	N		2N5031	AH	200M	A	15	10	0	25	300	1.0M							
2N5033	Field-Effect Transistors, see Table on Page 2-81																			
2N5034	S	N	2N5877	2N5875	AP	83W	C	150	55	45	R	20	70	2.5A	2.5	6.0A	15	E		
2N5035	S	N	2N5877	2N5875	AP	83W	C	150	55	45	R	20	70	3.0A	3.0	8.0A	15	E		
2N5036	S	N	2N5877	2N5875	AP	83W	C	150	70	60	R	20	70	2.5A	2.5	6.0A	15	E		
2N5037	S	N	2N5877	2N5875	AP	83W	C	150	70	60	R	20	70	3.0A	3.0	8.0A	15	E		
2N5038	S	N			SP	140W	C	200	150	150	V	20	100	12A	2.5	20A				
2N5039	S	N			SP	140W	C	200	120	120	V	20	100	10A	2.5	20A				
2N5040	S	P			A	300M	A	125	25	25	0	30	600	150M	1.0	0.5A			100M	T
2N5041	S	P			A	300M	A	125	40	40	0	40	150	150M	0.5	0.5A			80M	T



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						$P_D$ @ 25°C * @ 75°C	$T_J$ °C	$V_{CB}$ (volts)	$V_{CE-}$ (volts)	Subscript	$h_{FE}$ @ $I_C$		$V_{CE(SAT)}$ @ $I_C$		$h_{f-}$	Subscript	$f_{-}$	Subscript		
						Ref Point					(min)	(max)	Units	(volts)	Units				Units	
2N5042 2N5043 2N5044 2N5045 thru 2N5067	S G G	P P P			A A A	800M 30M 30M	A A A	200 125 125	40 15 15	40 7.0 7.0	0 0 0	40 150 150	150M 3.0M 3.0M	1.1 3.0M 3.0M	0.5A		100M	T		
Field-Effect Transistors, see Table on Page 2-81																				
2N5047 2N5048 2N5049 2N5050 2N5051 2N5052 2N5053	S S S S S S	N N N N N N			SP SP AP AP AP	100W 100W 40W 40W 40W	C C C C C	175 175 200 200 200	120 60 120 150 200	100 50 120 150 200	0 0 0 0 0	15 15 35 35 35	60 10A 10A 0.5A 0.5A	2.0 10A 2.5 0.9 0.9	10A 10A 0.5A 0.5A 0.5A		10M 10M 20M 20M 20M	T T T T T		
2N5054 2N5055 2N5056 2N5057 2N5058 2N5059 2N5060 thru 2N5066	S S S S S S	N P P P N N			AH SH SH A A	200M 200M 360M 1.0W 1.0W	A C C C C	200 125 200 200 200	30 12 15 300 250	15 12 15 300 250	0 0 0 0 0	25 30 30 35 30	150 100 100 100 150	2.0M 30M 30M 30M 30M	0.13 1.0M 0.13 1.0M 1.0M		1300M	T		
Thyristors, see Table on Page 2-70																				
2N5064 2N5065 2N5066 2N5067	S S S S	N N N N			SH SC AF	2.5W 400M 87.5W	C C C	200 200 200	25 30 40	15 20 40	0 0 0	50 120 20	300M 1.0A	0.23 1.0A	100M	20	E	550M 5.0M 4.0M	T T T	
2N5068 2N5069 2N5070 2N5071 2N5072 2N5073 2N5074 2N5075 2N5076 2N5077	S S S S S S S S S S	N N N N N N N N N N	2N5068 2N5069 2N5071		AP AHP AHP AHP AH AP AP AP AP	87.5W 87.5W 70W 70W 600M 70W 70W 70W 70W 70W	C C C C A C C C C C	200 200 200 200 200 200 200 200 200 200	60 80 65 30 180 120 200 200 250 250	60 80 30 100 120 120 110 250 110 90	0 0 0 R 0 0 0 0 0 0	20 20 10 15 30 30 250 250 250 250	80 80 100 100 120 200M 0.5A 0.5A 0.5A 0.5A	0.4 0.4 1.0 10A 2.0 2.0 2.0 2.0 2.0	1.0A 1.0A 10A 10A 3.0A 3.0A 3.0A 3.0A 3.0A	20 20 30 30 30 30 30 30 30	E E E E E E E E E	4.0M 4.0M 100M 100M 40M 40M 40M 40M 40M	T T T T T T T T T	
2N5078 2N5079 2N5080 2N5081 2N5082 2N5083 2N5084 2N5085 2N5086 2N5087 2N5088 2N5089 2N5090 2N5091	S S S S S S S S S S S S S S	N N N N N N N N P P N N N P			A AH AH SP SP A A A A AHP	1.8W 1.2W 1.2W 35W 35W 310M 310M 310M 310M 4.0W	C C C C C A A A A C	200 200 200 200 200 135 135 135 135 175	60 70 60 120 120 50 50 35 30 55	30 50 30 60 60 50 50 25 30 300	0 0 0 0 0 0 0 0 0 0 0	100 500 100 40 100 500 800 400 1200 200	150M 500 1.0M 1.0M 2.0A 0.1M 0.1M 0.1M 0.1M 50M	0.2 0.2 0.2 1.0 2.0 0.3 0.3 0.5 0.5 1.0	150M 600M 10M 10A 10A 10M 10M 10M 10M 100M	100 100 100 150 450	E E E E E E E E E	500M 600M 600M 50M 80M 50M 40M 40M 50M 500M	T T T T T T T T T T T	
2N5092 2N5093 2N5094 2N5095 2N5096 2N5097 2N5098 2N5099 2N5100 2N5101 2N5102 2N5103 thru 2N5105	S S S S S S S S S S S S	N P P P P N N N P P N N			A A A A A A A A A A A AHP	400 400 450 500 500 600 700 800 450 500 90	C C C C C C C C C C C	175 175 175 175 175 175 175 175 175 175	400 400 450 500 450 600 500 550 400 400 90	350 350 400 400 450 450 500 550 400 400 50	0 0 0 0 0 0 0 0 0 0 R	50 40 40 50 40 50 50 50 40 50 10	300 250 25M 25M 25M 25M 25M 25M 25M 25M 500M	0.5 3.0 3.0 0.5 3.0 0.5 0.5 0.5 3.0 0.5	25M 25M 25M 25M 25M 25M 25M 25M 25M 25M			50M 20M 20M 20M 20M 50M 50M 50M 20M 50M 150M	T T T T T T T T T T T	
Field-Effect Transistors, see Table on Page 2-81																				
2N5106 2N5107 2N5108 2N5109 2N5110 2N5111 2N5112 2N5113 2N5114 thru 2N5116	S S S S S S S S S	N N N N P P P P P			A A AHP AHP AP AP AP AP AP	800M 360M 3.5W *2.5W 5.0W 5.0W 34W 34W	A C C C C C C C C	200 200 55 40 175 175 175 175	60 60 55 20 40 80 40 80	30 30 R 0 0 0 0 0	100 100 0 70 15 15 15 15	300 300 210 50M 500M 500M 500M 500M	0.22 0.22	150M 150M			250M 250M 1.2G 1.0M 1.0M 1.0M 1.0M	T T T T T T T T		
Field-Effect Transistors, see Table on Page 2-81																				
2N5116 2N5117 2N5118 2N5119 2N5120 2N5121 2N5122 2N5123 2N5124 2N5125	S S S S S S S S S S	P P P P P P P P P P			AM AM AM AM AM AM AM AM AM AM	400M 400M 400M 300M 300M 300M 400M 400M 400M	C C C C C C C C C	45 45 45 45 45 45 45 45 45	45 45 45 45 45 45 45 45 45	0 0 0 0 0 0 0 0 0	100 100 50 100 100 100 100 100 50	300 300 800 300 300 300 300 300 800	0.010M 0.010M 0.010M 0.010M 0.010M 0.010M 0.010M 0.010M 0.010M							
2N5126 2N5127 2N5128 2N5129 2N5130 2N5131 2N5132 2N5133 2N5134 2N5135 2N5136 2N5137 2N5138 2N5139 2N5140	S S S S S S S S S S S S S S S	N N N N N N N N N N N P P P P	MPS6539 MPS918 2N5220 2N5220 MPS3563 2N5223 MPS6539 MPS2714 2N5224 2N5225 MPS3706 MPS6560 MPS6516 MPS6516		A A A A A A A A A A A A A A SH	200M 200M 200M 200M 300M 200M 200M 200M 200M 300M 220M 300M 200M 200M 200M	A A A A A A A A A A A A A A A	125 125 15 15 125 125 125 125 125 125 125 125 125 125 125	20 12 12 12 15 12 20 18 20 25 30 30 30 30 20	20 12 12 12 12 12 20 20 10 20 20 20 20 20	0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 15 35 35 15 15 30 60 150 600 400 50 800	350 4M 50M 50M 250M 8M 10M 1.0M 1.0M 1.0M 150M 150M 100* 1.0M	2.0 0.3 0.25 0.25 0.6 1.0 1.0 0.4 0.2 1.0 0.25 0.25 0.3 0.15	10M 10M 150M 150M 10M 10M 10M 1.0M 1.0M 1.0M 150M 150M 10M 1.0M	15 12 25 25 12 25 50	E E E E E E E E E E E E E	150M 150M	T T	



## 2N5141-2N5243

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	Units	Units					Units	
2N5141	S	P			SH	200M	A	125	6.0	6.0	0	30		30M	0.2	10M					
2N5142	S	P			SH	300M	A	125	20	20	0	30		50M	0.5	50M					
2N5143	S	P			SH	200M	A	125	20	20	0	30		50M	0.5	50M					
2N5144	S	N			SH	360M	A	200	50	30	0	60	150	100M	0.2	100M			300M	T	
2N5145	S	N			SH	800M	A	200	50	30	0	60	150	100M	0.2	100M			300M	T	
2N5146	S	P		2N5146	A	400M	A	40	40	40	0	20		1.0A	1.0	1.0A			150M	T	
2N5147	S	P	2N6190	2N5147	AP	1.0W	A	200	100	80	0	30	90	1.0A	5.0	3.0A	20	E	50M	T	
2N5148	S	N	2N5336	2N5148	AP	1.0W	A	200	100	80	0	30	90	1.0A	5.0	3.0A	20	E	50M	T	
2N5149	S	P	2N6191	2N5149	AP	1.0W	A	200	100	80	0	70	200	1.0A	5.0	3.0A	50	E	60M	T	
2N5150	S	N	2N5337	2N5150	AP	1.0W	A	200	100	80	0	70	200	1.0A	5.0	3.0A	50	E	60M	T	
2N5151	S	P	2N6190	2N5151	AP	1.0W	A	200	100	80	0	30	90	2.5A	1.5	5.0A	20	E	60M	T	
2N5152	S	N	2N5336	2N5152	AP	1.0W	A	200	100	80	0	30	90	2.5A	1.5	5.0A	20	E	60M	T	
2N5153	S	P	2N6191	2N5153	AP	1.0W	A	200	100	80	0	70	200	2.5A	1.5	5.0A	50	E	70M	T	
2N5154	S	N	2N5337	2N5154	AP	1.0W	A	200	100	80	0	70	200	2.5A	1.5	5.0A	50	E	70M	T	
2N5155	G	P		2N5155	SP			110	140	120	0	25	100	8.0A	0.9	25A			100G	T	
2N5156	G	P			SP	93W	C	100	100	60	0	25	60	5.0A	1.0	10A			150G	T	
2N5157	G	P	2N5157	2N5157	SP			150	700	500	0	30	90	1.0A	2.5	3.5A			2.8M	T	
2N5158	Field-Effect Transistors, see Table on Page 2-81																				
2N5159	Field-Effect Transistors, see Table on Page 2-81																				
2N5160	S	P		2N5160	AHP	5.0W	C		60	40	0	10		50M					500M	T	
2N5161	S	P		2N5161	AHP	20W	C		60	40	0	10		250M							
2N5162	S	P		2N5161	AHP	50W	C		60	40	0	10		2.0A							
2N5163	Field-Effect Transistors, see Table on Page 2-81																				
2N5164,R	Thyristors, see Table on Page 2-70																				
2N5171,R	Thyristors, see Table on Page 2-70																				
2N5172	S	N			A	200M	A		25	25	0	100	500	10M	0.25	10M	100	E			
2N5174	S	N			A	200M	A		90	75	0	40	600	10M	0.95	10M	40	E			
2N5175	S	N			A	200M	A		130	100	0	55	160	10M	0.95	10M	55	E			
2N5176	S	N			A	200M	A		130	100	0	140	300	10M	0.95	10M	140	E			
2N5177	S	N			AHP	40W	C	200	60	35	0	10	150	100M					200M	T	
2N5178	S	N			AHP	70W	C	200	60	35	0	10	150	200M					200M	T	
2N5179	S	N		2N5179	AH	200M	A		20	12	0	25	250	3.0M	0.4	10M	25	E	900M	T	
2N5180	S	N			AH	180M	A		30	15	0	20	200	2.0M					650M	T	
2N5181	S	N			AH	180M	A		45		0	27		1.0M					400M	T	
2N5182	S	N			AH	180M	A		35		0	27		1.0M					400M	T	
2N5183	S	N			AH	500M	A		18	18	0	75		10M			70	E	62.5M	T	
2N5184	S	N			AH	500M	A		120	0	0	10		50M							
2N5185	S	N			AH	1.0W	A		120	0	0	10		50M					50M	T	
2N5186	S	N			SH	300M	A		10	5.0	S	25		10M	0.3	10M					
2N5187	S	N			SH	1.0W	A		25	25	S	30		10M	0.25	10M					
2N5188	S	N			SH	800M	A		60	55	S	25		150M	0.5	150M					
2N5189	S	N			SH	1.0W	A		60	55	S	15		1.0M	1.0	1.0A					
2N5190	S	N	2N5190	2N5190	AP	40W	C	150	40	40	0	25	100	1.5A	1.4	4.0A	20	E			
2N5191	S	N	2N5191	2N5190	AP	40W	C	150	60	60	0	25	100	1.5A	1.4	4.0A	20	E			
2N5192	S	N	2N5192	2N5190	AP	40W	C	150	80	80	0	20	80	1.5A	1.4	4.0A	20	E			
2N5193	S	P	2N5193	2N5193	AP	40W	C	150	40	40	0	25	100	1.5A	1.4	4.0A	20	E			
2N5194	S	P	2N5194	2N5193	AP	40W	C	150	60	60	0	25	100	1.5A	1.4	4.0A	20	E			
2N5195	S	P	2N5195	2N5193	AP	40W	C	150	80	80	0	20	80	1.5A	1.4	4.0A	20	E			
2N5196	Field-Effect Transistors, see Table on Page 2-81																				
2N5199	Field-Effect Transistors, see Table on Page 2-81																				
2N5200	S	N			A	1.2W	C	250	20	20	0	50	150	10M	0.5	50M			900M	T	
2N5201	S	N			A	1.2W	C	250	20	20	0	75	150	10M	0.5	50M			1100M	T	
2N5202	S	N	2N5427	2N5427	SP	35W	C	200	100	75	V	10	100	4.0A	1.2	4.0A			60M	T	
2N5204	Thyristors, see Table on Page 2-70																				
2N5207	S	P			2N5208	AH	310M	A		30	25	0	20	120	2.0M						
2N5208	S	N			2N5209	A	310M	A		50	50	0	100	300	0.1M	0.7	10M	150	E		
2N5209	S	N			2N5209	A	310M	A		50	50	0	200	600	0.1M	0.7		250	E		
2N5210	S	N			AHP	3.0W	C	200	80	80	0	10	60	0.2A	0.5	0.54A			200M	T	
2N5211	S	N			AHP	7.5W	C	200	80	80	0	10	60	0.2A	0.5	0.54A			200M	T	
2N5212	S	N			AHP	7.5W	C	200	70	40	0	10	80	0.2A	0.5	0.5A			350M	T	
2N5213	S	N			AHP	60W	C	200	95	95	S	10	75	1.0A	1.5	4.5A			150M	T	
2N5214	S	N			AHP	23W	C	200	70	70	0	10	80	0.5A	0.5	1.0A			400M	T	
2N5215	S	N			AHP	25W	C	200	80	80	0	10	60	0.5A	1.2	1.5A			350M	T	
2N5216	S	N			AHP	7.5W	C	200	80	80	0	10	80	0.2A	0.5	0.5A			350M	T	
2N5217	S	N			AP		C	200	220	200	0	15	120	5.0A	0.6	5.0A	40	E	40M	T	
2N5218	S	N			A	310M	A		20	15	0	35	500	2.0M	0.4	10M	35	E			
2N5219	S	N		2N5219	A	310M	A		15	15	0	30	600	50M	0.5	150M	30	E			
2N5220	S	N			A	310M	A		15	15	0	30	600	50M	0.5	150M	30	E			
2N5221	S	P		2N5221	A	310M	A		15	15	0	30	600	50M	0.5	150M	30	E			
2N5222	S	N			A	310M	A		20	15	0	20	1500	4.0M	1.0	4.0M	20	E			
2N5223	S	N		2N5223	A	310M	A		25	20	0	50	800	2.0M	0.7	10M	50	E			
2N5224	S	N		2N5224	SH	310M	A		25	12	0	40	400	10M	0.35	10M					
2N5225	S	N		2N5225	A	310M	A		25	25	0	30	600	50M	0.8	100M	30	E			
2N5226	S	P		2N5226	A	310M	A		25	25	0	30	600	50M	1.0	100M	30	E			
2N5227	S	P		2N5227	A	310M	A		30	30	0	50	700	2.0M	0.4	10M	50	E			
2N5228	S	P		2N5228	SH	310M	A		5.0	5.0	0	30		10M	0.4	10M					
2N5229	S	P			SC	2.0W	C		15	10	0	50		100*							
2N5230	S	P			SC	2.0W	C		30	20	0	50		100*							
2N5231	S	P			SC	2.0W	C		50	30	0	50		100*							
2N5232	S	N			A	330M	A		70	50	0	250	500	2.0M	0.125	10M	250	E			
2N5233	S	N			A	330M	A		80	60	0	100	300	10M	0.125	10M	100	E			



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	RefPoint	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub>	Subscript		
						@ 25°C	°C	(volts)	(volts)	Subscript	(min)	(max)	Units	(volts)	Units	—	Subscript	Units	Subscript	
2N5244 thru 2N5248	S	P			SH	1.0W	C	200		40	0	150	300	10M	0.12	10M			450M	T
Field-Effect Transistors, see Table on Page 2-81																				
2N5248 thru 2N5249	S	N			A	330M	A		70	50	0	400	800	2.0M	0.125	10M	400	E		
2N5249A	S	N			A	330M	A		70	50	0	400	800	2.0M	0.125	10M	400	E		
2N5252	S	N			A	7.0W	C	300	300	0	40	120	100M	1.0	200M			30M	T	T
2N5253	S	N			A	7.0W	C	300	300	0	80	250	100M	1.0	200M			30M	T	T
2N5254	S	P			AL	0.8W	C	125	40	0	50	750	0.1M	0.25	10M	70	E	40M	T	T
2N5255	S	P			AM	0.8W	C	125	40	0	150	750	0.10M	0.25	10M			40M	T	T
2N5256	S	P			AM	0.8W	C	125	40	0	150	750	0.10M	0.25	10M			40M	T	T
2N5257 thru 2N5261	Thyristors, see Table on Page 2-70																			
2N5262	S	N			SH	1.0W	A		75	50	0	35	100M	0.8	1.0A					
2N5264	S	N			SP	87W	C	200	400	180	0	30	300	1.0A	1.25	7.0A			50M	T
2N5265 thru 2N5270	Field-Effect Transistors, see Table on Page 2-81																			
2N5271	S	N			SH	600M	A													
2N5272	S	N			SH	360M	A		40	40	S	100	400	10M	0.25	10M			500M	T
2N5273 thru 2N5275	Thyristors, see Table on Page 2-70																			
2N5276	S	N			S	360M	A		25	15	0	30	90	1.0M	0.2	20M			600M	T
2N5277	Field-Effect Transistors, see Table on Page 2-81																			
2N5278	S	N			AH	5.0W	C		400			40	160	20M	0.5	50M			15M	T
2N5279	S	N			AH	15W	C	175	400			40	160	20M	0.5	50M			15M	T
2N5280	S	P			A			175	175	150	0	20	200	1.0M	2.0	10M			20M	T
2N5281	S	P			A			175	325	300	0	20	200	1.0M	2.0	10M			20M	T
2N5282	S	P			A			200	120	80	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5284	S	N	2N5346	2N5346	AP			200	120	80	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5285	S	N	2N5347	2N5346	AP			200	100	100	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5286	S	P	2N6188	2N6186	AP			200	100	100	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5287	S	P			AP			200	100	100	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5288	S	N	2N5349	2N5346	AP			200	120	100	0	30	90	5.0A	0.9	5.0A	20	E	30M	T
2N5289	S	N			AP			200	120	100	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5290	S	P			AP			200	100	100	0	30	90	5.0A	0.9	5.0A	20	E	30M	T
2N5291	S	P			AP			200	100	100	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5292	S	P			SH	1.0W	C	200	100	100	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5293	S	N	2N4922	2N4921	AP	36W	C	150	80	75	R	30	120	0.5A	2.0	3.6A	15	E	800M	T
2N5294	S	N	2N4922	2N4921	AP	36W	C	150	80	75	R	30	120	0.5A	2.0	3.6A	15	E		
2N5295	S	N	2N5190	2N5190	AP	36W	C	150	60	50	R	30	120	1.0A	2.0	3.6A	20	E		
2N5296	S	N	2N5190	2N5190	AP	36W	C	150	60	50	R	30	120	1.0A	2.0	3.6A	20	E		
2N5297	S	N	2N5190	2N5190	AP	36W	C	150	80	70	R	20	80	1.5A	2.0	3.6A	25	E		
2N5298	S	N	2N5190	2N5190	AP	36W	C	150	80	70	R	20	80	1.5A	2.0	3.6A	25	E		
2N5301	S	N	2N5301	2N5301	AP	200W	C	200	40	40	0	15	60	1.5A	0.75	10A	40	E		
2N5302	S	N	2N5303	2N5301	AP	200W	C	200	60	60	0	15	60	1.5A	0.75	10A	40	E		
2N5303	S	N	2N5303	2N5301	AP	200W	C	200	80	80	0	15	60	1.0A	1.0	10A	40	E		
2N5304	S	N			AL	25W	C	200	50	40	0	30	120	2.0A	0.4	2.0A	30	E	10M	T
2N5305	S	N			AL	450M	A		25	25	0	2K	20K	2.0M	1.4	200M	2000	E	60M	T
2N5306	S	N			AL	400M	A		25	25	0	7K	70K	2.0M	1.4	200M	7000	E	60M	T
2N5306A	S	N			A	400M	A		25	25	0	7K	70K	2.0M	1.4	200M	7K	E	60M	T
2N5307	S	N			AL	400M	A		40	40	0	2K	20K	2.0M	1.4	200M	2000	E	60M	T
2N5308	S	N			AL	400M	A		40	40	0	7K	70K	2.0M	1.4	200M	7000	E	60M	T
2N5308A	S	N			A	400M	A		40	40	0	7K	70K	2.0M	1.4	200M	7K	E	60M	T
2N5309	S	N			A	330M	A		70	50	0	60	120	10*	0.125	10M	66	E		
2N5310	S	N			A	330M	A		70	50	0	100	300	10*	0.125	10M	110	E		
2N5311	S	N			A	330M	A		70	50	0	250	500	10*	0.125	10M				
2N5312	S	P			AP	50W	C	200	80	80	0	30	90	10A	1.5	10A	30	E	30M	T
2N5313	S	N			AP	50W	C	200	80	80	0	30	90	10A	1.5	10A	30	E	30M	T
2N5314	S	P			AP	50W	C	200	100	100	0	30	90	10A	1.5	10A	30	E	30M	T
2N5315	S	N			AP	50W	C	200	100	100	0	30	90	10A	1.5	10A	30	E	30M	T
2N5316	S	P			AP	50W	C	200	80	80	0	30	90	5.0A	0.6	5.0A	30	E	30M	T
2N5317	S	N			AP	50W	C	200	80	80	0	30	90	5.0A	0.6	5.0A	30	E	30M	T
2N5318	S	P			AP	50W	C	200	100	100	0	30	90	5.0A	0.6	5.0A	30	E	30M	T
2N5319	S	N			AP	50W	C	200	100	100	0	30	90	5.0A	0.6	5.0A	30	E	30M	T
2N5320	S	N			SP	10W	C	200	100	75	0	30	130	500M	0.5	500M			50M	T
2N5321	S	N			SP	10W	C	200	75	50	0	40	250	500M	0.8	500M			50M	T
2N5322	S	P			SP	10W	C	200	100	75	0	30	130	500M	0.7	500M			50M	T
2N5323	S	P			SP	10W	C	200	75	50	0	40	250	500M	1.2	500M			50M	T
2N5324	G	P		2N5324	SP	56W	C	110	250	150	0	20	60	5.0A	0.5	10A			2.0M	T
2N5325	G	P		2N5324	SP	56W	C	110	325	200	0	20	60	5.0A	0.5	10A			2.0M	T
2N5326	S	N			SP	400W*	C	200	100	80	0	50	150	1.0A	1.0	5.0A				
2N5327	S	N			SP	450W*	C	200	100	80	0	100	300	1.0A	0.3	3.0A				
2N5328	S	N			SP	450W*	C	200	100	80	0	100	300	1.0A	0.6	5.0A				
2N5329	S	N			SP	1000W*	C	200	150	90	0	40	120	10A	1.8	20A				
2N5330	S	N			SP	1000W*	C	200	150	90	0	40	120	10A	0.6	10A				
2N5331	S	N			SP	1000W*	C	200	150	90	0	40	120	10A	0.6	10A				
2N5332	S	P			SH	360M	A		20	12	0	20	80	1.0M	0.2	20M			600M	T
2N5333	S	P			AP	1.0W	A	200	100	80	0	30	120	1.0A	1.0	2.0A	30	E	30M	T
2N5334	S	N	2N5334	2N5334	SP	6.0W	C	200	60	60	0	30	150	1.0A	0.7	2.0A			40M	T
2N5335	S	N	2N5335	2N5334	SP	6.0W	C	200	80	80	0	30	150	1.0A	0.7	2.0A			40M	T
2N5336	S	N	2N5336	2N5336	SP	6.0W	C	200	80	80	0	30	120	2.0A	0.7	2.0A			30M	T
2N5337	S	N	2N5337	2N5336	SP	6.0W	C	200	80	80	0	60	240	2.0A	0.7	2.0A			30M	T
2N5338	S	N	2N5338	2N5336	SP	6.0W	C	200	100	100	0	30	120	2.0A	0.7	2.0A			30M	T
2N5339	S	N	2N5339	2N5336	SP	6.0W	C	200	100	100	0	60	240	2.0A	0.7	2.0A			30M	T
2N5340	S	P	2N5340	2N5344	SP	40W	C	200	250	250	0	25	100	500M	3.0	1.0A			60M	T
2N5345	S	P	2N5345	2N5344	SP	40W	C	200	300	300	0	25	100	500M	3.0	1.0A			60M	T
2N5346	S	N	2N5346	2N5346	SP	60W	C	200	80	80	0	30	120	2.0A	0.7	2.0A			30M	T



2N5347-2N5454

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f <sub>T</sub> Units	Subscript		
											(min)	(max)	Units	(volts)					Units	
2N5347	S	N	2N5347	2N5346	SP	60W	C	200	80	80	0	30	120	2.0A	0.7	2.0A			30M	T
2N5348	S	N	2N5348	2N5346	SP	60W	C	200	100	100	0	60	240	2.0A	0.7	2.0A			30M	T
2N5349	S	N	2N5349	2N5346	SP	60W	C	200	100	100	0	60	240	2.0A	0.7	2.0A			30M	T
2N5350	S	N			SP	350W	C	200	125	100	0	10	40	70A	5.0	90A			10M	T
2N5351	S	N			SP	350W	C	200	180	150	0	10	40	70A	5.0	90A			10M	T
2N5354	S	P			A	360M	A		25	25	0	40	120	50M	0.25	50M	32	E		
2N5355	S	P			A	360M	A		25	25	0	100	300	50M	0.25	50M	80	E		
2N5356	S	P			A	360M	A		25	25	0	250	500	50M	0.25	50M	200	E		
2N5357	S	P	2N5345	2N5357	SP	30W	C	200	300	300	0	25	100	500M	0.3	100M			50M	T
2N5358 thru 2N5364	Field-Effect Transistors, see Table on Page 2-81																			
2N5365	S	P			A	360M	A		40	40	0	40	120	50M	0.25	50M	32	E		
2N5366	S	P			A	360M	A		40	40	0	100	300	50M	0.25	50M	80	E		
2N5367	S	P			A	360M	A		40	40	0	250	500	50M	0.25	50M	200	E		
2N5368	S	N			A	360M	A	150	60	30	0	60	200	150M	0.3	150M			250M	T
2N5369	S	N			A	360M	A	150	60	30	0	100	300	150M	0.3	150M			250M	T
2N5370	S	N			A	360M	A	150	60	30	0	200	600	150M	0.3	150M			250M	T
2N5371	S	N			A	360M	A	150	40	30	0	60	600	150M	0.3	150M			250M	T
2N5372	S	P			A	360M	A	150	60	30	0	40	120	150M	0.3	150M			150M	T
2N5373	S	P			A	360M	A	150	60	30	0	100	300	150M	0.3	150M			150M	T
2N5374	S	P			A	360M	A	150	60	30	0	200	400	150M	0.3	150M			150M	T
2N5375	S	P			A	360M	A	150	40	30	0	40	400	150M	0.3	150M			150M	T
2N5376	S	N			A	360M	A	150	60	30	0	100	500	0.010M	0.2	10M	120	E		300M
2N5377	S	N			A	360M	A	150	60	30	0	40	200	0.010M	0.2	10M	100	E		300M
2N5378	S	P			A	360M	A	150	40	30	0	100	500	0.010M	0.2	10M	120	E		200M
2N5379	S	P			A	360M	A	150	40	30	0	40	200	0.010M	0.2	10M	100	E		200M
2N5380	S	P			AP	360M	A	150	60	40	0	50	150	10 M	0.2	10 M	50	E		250 M
2N5381	S	P			AP	360M	A	150	60	40	0	100	300	10 M	0.2	10 M	100	E		300 M
2N5382	S	P			AP	360M	A	150	40	40	0	150	150	10 M	0.25	10 M	50	E		200 M
2N5383	S	N			AP	360M	A	150	40	40	0	100	300	10 M	0.25	10 M	100	E		250 M
2N5384	S	P			A	2.0W	A	200	100	80	0	20	80	2.0A	1.4	5.0A	20	E		30M
2N5385	S	P	2N6186	2N6182	A	2.0W	A	200	100	80	0	20	80	2.0A	1.4	5.0A	20	E		30M
2N5386	S	P	2N6186	2N6182	A	3.5W	A	200	100	80	0	20	80	6.0A	1.4	12A	20	E		30M
2N5387	S	N			A	3.5W	A	200	200	200	0	25	100	2.0A	2.2	7.0A	20	E		15M
2N5388	S	N			A	3.5W	A	200	250	250	0	25	100	2.0A	2.2	7.0A	20	E		15M
2N5389	S	N			A	3.5W	A	200	300	300	0	25	100	2.0A	2.2	7.0A	20	E		15M
2N5390	S	N			AL	1.0W	C	200	120	80	0	2K	20K	2.0A	2.5	5.0A			40M	T
2N5391 thru 2N5398	Field-Effect Transistors, see Table on Page 2-81																			
2N5399	S	N			SH	360M	A		25	15	0	30	90	1.0M	0.2	20M			600M	T
2N5400	S	P		2N5400	A	310M	A		130	120	0	40	180	10M	0.25	50M	30	E		100M
2N5401	S	P		2N5400	A	310M	A		160	150	0	60	240	10M	0.25	50M	40	E		100M
2N5404	S	P	2N6190	2N6190	AP	1.0W	A	200	80	80	0	20	60	2.0A	0.6	2.0A	20	E		40M
2N5405	S	P	2N6192	2N6190	AP	1.0W	A	200	100	100	0	20	60	2.0A	0.6	2.0A	20	E		40M
2N5406	S	P	2N6191	2N6190	AP	1.0W	A	200	80	80	0	40	120	2.0A	0.6	2.0A	40	E		40M
2N5407	S	P	2N6193	2N6190	AP	1.0W	A	200	100	100	0	40	120	2.0A	0.6	2.0A	40	E		40M
2N5408	S	P	2N6186	2N6182	AP	30W	C	200	80	80	0	20	60	2.0A	0.6	2.0A	20	E		40M
2N5409	S	P	2N6188	2N6182	AP	30W	C	200	100	100	0	20	60	2.0A	0.6	2.0A	20	E		40M
2N5410	S	P	2N6187	2N6182	AP	30W	C	200	80	80	0	40	120	2.0A	0.6	2.0A	40	E		40M
2N5411	S	P	2N6189	2N6182	AP	30W	C	200	100	100	0	40	120	2.0A	0.6	2.0A	40	E		40M
2N5412	S	N			AP	100W	C	175	80	60	0	10	160	2.0A	1.0	10A	20	E		
2N5413	S	N			SH	1.0W	A		60	40	0	25	100	2.0A	0.25	150M				
2N5414	S	N			SH	1.0W	A		80	50	0	25	100	2.0A	0.25	150M				
2N5415	S	P			AH	10W	C		200	100	30	150	50M						15M	T
2N5416	S	P			AH	10W	C		350		30	120	50M						15M	T
2N5417	S	N			SH	500M	A		40	35	0	80	250	150M	0.55	150M			250M	T
2N5418	S	N			A	360M	A		25	25	0	40	120	50M	0.25	50M	25	E		
2N5419	S	N			A	360M	A		25	25	0	100	300	50M	0.25	50M	70	E		
2N5420	S	N			A	360M	A		25	25	0	250	500	50M	0.25	50M	150	E		
2N5421	S	N			AHP	3.0W	C		36	18	0	10	60	0.1A	0.5	0.2A			300M	T
2N5422	S	N			AHP	5.0W	C		36	18	0	10	60	0.5A	0.5	0.5A			300M	T
2N5423	S	N			AHP	12W	C		36	18	0	20	70	1.0A	0.5	1.0A			300M	T
2N5424	S	N			AHP	20W	C		36	18	0	20	100	2.0A	0.5	2.0A			250M	T
2N5424A	S	N			AH	20W	C		36	18	0	20	100	2.0A	0.5	2.0A			250M	T
2N5425	S	N			AH				60	60	0	500	5.0A	2.5	5.0A					
2N5426	S	N			AH				60	60	0	1000	5.0A	2.2	5.0A					
2N5427	S	N	2N5427	2N5427	SP	35W	C	200	80	80	0	30	120	2.0A	0.7	2.0A			30M	T
2N5428	S	N	2N5428	2N5427	SP	35W	C	200	80	80	0	60	240	2.0A	0.7	2.0A			30M	T
2N5429	S	N	2N5429	2N5427	SP	35W	C	200	100	100	0	30	120	2.0A	0.7	2.0A			30M	T
2N5430	S	N	2N5430	2N5427	SP	35W	C	200	100	100	0	60	240	2.0A	0.7	2.0A			30M	T
2N5431	Unijunction Transistors, see Table on Page 2-88																			
2N5432	Field-Effect Transistors, see Table on Page 2-81																			
2N5433																				
2N5434																				
2N5435	G	P			SP	120W	C	110	80	60	0	20	60	25A	0.75	60A				
2N5436	G	P			SP	120W	C	110	110	90	0	20	60	25A	0.75	60A				
2N5437	G	P			SP	120W	C	110	140	120	0	20	60	25A	0.75	60A				
2N5438	G	P			SP	120W	C	110	80	60	0	40	120	25A	0.50	60A				
2N5439	G	P			SP	120W	C	110	110	90	0	40	120	25A	0.50	60A				
2N5440	G	P			SP	120W	C	110	140	120	0	40	120	25A	0.50	60A				
2N5447	S	N			A	360M	A		40	25	0	60	300	50M	0.25	50M				
2N5448	S	N			A	360M	A		50	30	0	30	150	50M	0.25	50M				
2N5449	S	N			A	360M	A		50	30	0	100	300	50M	0.6	100M				
2N5450	S	N			A	360M	A		50	30	0	50	150	50M	0.8	100M				
2N5451	S	N			A	360M	A		40	20	0	30	600	50M	1.0	100M				
2N5452 thru 2N5454	Field-Effect Transistors, see Table on Page 2-81																			



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript		
											(min)	(max)	Units	(volts)	Units			Units			
2N5455 2N5456 2N5457 thru 2N5465	S	P			SH	340M	A	200	15	15	0	30	120	30M	0.50	300M			450M	T	
2N5466 2N5467 2N5468 2N5469 2N5470 2N5471 thru 2N5476	S	P			SH	340M	A	200	25	25	0	30	120	30M	0.55	300M			450M	T	
Field-Effect Transistors, see Table on Page 2-81																					
2N5477 2N5478 2N5479 2N5480 2N5481 2N5482 2N5483	S	N			AP			200	500	400	0	15	60	3.0A	0.5	3.0A	25	E			
	S	N			AP			200	700	400	0	15	60	3.0A	0.5	3.0A	25	E			
	S	N			AP			200	500	400	0	15	60	3.0A	0.5	3.0A	25	E			
	S	N			AP			200	700	400	0	15	60	3.0A	0.5	3.0A	25	E			
	S	N			AH	3.5W	C		55	55	0	R									
Field-Effect Transistors, see Table on Page 2-81																					
2N5477 2N5478 2N5479 2N5480 2N5481 2N5482 2N5483	S	N	2N5477	2N5477	SP	60W	C	200	80	80	0	30	120	2.0A	0.7	2.0A			30M	T	
	S	N	2N5478	2N5477	SP	60W	C	200	80	80	0	60	240	2.0A	0.7	2.0A			30M	T	
	S	N	2N5479	2N5477	SP	60W	C	200	100	100	0	30	120	2.0A	0.7	2.0A			30M	T	
	S	N	2N5480	2N5477	SP	60W	C	200	100	100	0	60	240	2.0A	0.7	2.0A			30M	T	
	S	N			AHP	5.0W	C		50	30	0	20		50M							
	S	N			AHP	10W	C		50	30	0	20		50M							
	S	N			AHP	20W	C		45	30	0	20		100M							
Field-Effect Transistors, see Table on Page 2-81																					
2N5484 thru 2N5486	S	N			SP	15W	C	200	120	80	0	100	300	1.0A	0.25	1.0A					
2N5487 2N5488 2N5489 2N5490 2N5491 2N5492 2N5493 2N5494 2N5495 2N5496 2N5497 2N5498 2N5515 thru 2N5524	S	N			SP	15W	C	200	150	100	0	40	120	1.0A	0.25	1.0A					
2N5525 2N5526	S	N			AL	360M	A		40	30	0	5000	10M	1.0	50M	5000	E	200M	T		
2N5527 2N5528 2N5529 2N5530 2N5531 2N5532 2N5533 2N5534 2N5535 2N5536 2N5537 2N5538 2N5539 2N5540 2N5541 2N5542	S	N			AP	5.0W	C	200	60	40	0	40	200	3.0A	1.25	3.0A	20	E	200M	T	
	S	N			AP	35W	C	200	60	40	0	40	200	3.0A	1.25	3.0A	20	E	200M	T	
	S	N			AP	35W	C	200	60	40	0	40	200	3.0A	1.25	3.0A	20	E	200M	T	
	S	N			AP	35W	C	200	60	40	0	40	200	3.0A	1.25	3.0A	20	E	200M	T	
	S	N			AP	5.0W	C	200	90	75	0	30	150	3.0A	1.25	3.0A	20	E	200M	T	
	S	N			AP	35W	C	200	90	75	0	30	150	3.0A	1.25	3.0A	15	E	200M	T	
	S	N			AP	35W	C	200	90	75	0	30	150	3.0A	1.25	3.0A	15	E	200M	T	
	S	N			AP	35W	C	200	90	75	0	30	150	3.0A	1.25	3.0A	15	E	200M	T	
	S	N			AP	50W	C	200	60	50	0	30	150	10A	1.25	5.0A	25	E	150M	T	
	S	N			AP	50W	C	200	60	50	0	30	150	10A	1.25	5.0A	25	E	150M	T	
	S	N			AP	50W	C	200	90	75	0	20	150	10A	1.25	5.0A	20	E	150M	T	
	S	N			AP	50W	C	200	90	75	0	20	150	10A	1.25	5.0A	20	E	150M	T	
	S	N			SP			200	175	130	0	25	75	10A	3.0	20A			20M	T	
	S	N			SP			200	325	300	0	20	60	5.0A	2.5	10A			20M	T	
	S	N			SP			200	175	130	0	30	90	5.0A	2.5	10A			20M	T	
	S	N			SP			200	175	130	0	30	90	5.0A	2.5	10A			20M	T	
Field-Effect Transistors, see Table on Page 2-81																					
2N5543 thru 2N5549	S	N																			
2N5550 2N5551 2N5552 2N5555 thru 2N5558	S	N			2N5550	A	310M	A		160	140	0	60	250	10M	0.25	50M			100M	T
	S	N			2N5550	A	310M	A		180	160	0	80	250	10M	0.20	50M			100M	T
	S	N			SP	15W	C	200	120	80	0	50	150	5.0A	0.5	5.0A					
Field-Effect Transistors, see Table on Page 2-81																					
2N5559 2N5560	S	N	2N5633	2N5632	SP			200	150	120	X	20	30	60	4.0A	0.75	4.0A				
	S	N						200	175	120	X	30	90	15A	0.8	15A					
Field-Effect Transistors, see Table on Page 2-81																					
Thyristors, See Table on Page 2-70																					
2N5567 thru 2N5574	S	N																			
2N5581 2N5582 2N5583 2N5584 2N5589 2N5590 2N5591	S	N			2N5581	SH	2.0W	C		75	40	0	40	120	150M	0.3	150M			250M	T
	S	N			2N5581	SH	2.0W	C		75	40	0	100	300	150M	0.3	150M			300M	T
	S	N			2N5583	SH	5.0W	C		30	30	0	25	100	100M	0.8	100M			1.3G	T
	S	N			SH			C	200	225	180	0	40	120	10A	1.8	20A				
	S	N			AP	15W	C		36	18	0	5.0		100M					200M	T	
	S	N			AP	30W	C		36	18	0	5.0		250M					200M	T	
	S	N			AP	70W	C		36	18	0	5.0		200M					200M	T	
Field-Effect Transistors, see Table on Page 2-81																					
2N5592 thru 2N5594	S	N																			



**2N5595-2N5664**

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>			V <sub>CE(SAT)</sub> @ I <sub>C</sub>			h <sub>FE</sub>	Subscript	f <sub>T</sub>
2N5595	S	N			AP	30W	C	200	55	30	0	20		50M					1.5G	T
2N5596	S	N			AP	40W	C	200	55	30	0	20		50M					1.5G	T
2N5597	S	N			AP	20W	C	200	80	60	0	70	200	1.0A	0.46	1.0A	50	E	60M	T
2N5598	S	N			AP	20W	C	200	80	60	0	70	200	1.0A	0.46	1.0A	50	E	60M	T
2N5599	S	N			AP	20W	C	200	100	80	0	30	90	1.0A	0.46	1.0A	20	E	50M	T
2N5600	S	N			AP	20W	C	200	100	80	0	30	90	1.0A	0.46	1.0A	20	E	50M	T
2N5601	S	N			AP	20W	C	200	100	80	0	70	200	1.0A	0.46	1.0A	50	E	60M	T
2N5602	S	N			AP	20W	C	200	100	80	0	70	200	1.0A	0.46	1.0A	50	E	60M	T
2N5603	S	N			AP	20W	C	200	120	100	0	30	90	1.0A	0.46	1.0A	20	E	50M	T
2N5604	S	N			AP	20W	C	200	120	100	0	30	90	1.0A	0.46	1.0A	20	E	50M	T
2N5605	S	P			AP	25W	C	200	80	60	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5606	S	N			AP	25W	C	200	80	60	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5607	S	N			AP	25W	C	200	100	80	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5608	S	N			AP	25W	C	200	100	80	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5609	S	N			AP	25W	C	200	100	80	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5610	S	N			AP	25W	C	200	100	80	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5611	S	N			AP	25W	C	200	120	100	0	30	90	2.5A	1.45	2.5A	20	E	60M	T
2N5612	S	N			AP	25W	C	200	120	100	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5613	S	N			AP	58W	C	200	80	60	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5614	S	N			AP	58W	C	200	80	60	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5615	S	P			AP	58W	C	200	100	80	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5616	S	N			AP	58W	C	200	100	80	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5617	S	N			AP	58W	C	200	100	80	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5618	S	N			AP	58W	C	200	100	80	0	70	200	2.5A	0.75	2.5A	50	E	70M	T
2N5619	S	N			AP	58W	C	200	120	100	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5620	S	N			AP	58W	C	200	120	100	0	30	90	2.5A	0.75	2.5A	20	E	60M	T
2N5621	S	P			AP	116W	C	200	80	60	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5622	S	N			AP	116W	C	200	80	60	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5623	S	P			AP	116W	C	200	100	80	0	30	90	5.0A	0.9	5.0A	20	E	30M	T
2N5624	S	N			AP	116W	C	200	100	80	0	30	90	5.0A	0.9	5.0A	20	E	30M	T
2N5625	S	P			AP	116W	C	200	100	80	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5626	S	N			AP	116W	C	200	100	80	0	70	200	5.0A	0.9	5.0A	50	E	40M	T
2N5627	S	P			AP	116W	C	200	120	100	0	30	90	5.0A	0.9	5.0A	20	E	30M	T
2N5628	S	N			AP	116W	C	200	120	100	0	30	90	5.0A	0.9	5.0A	20	E	30M	T
2N5629	S	N	2N5626	2N5629	AP	200W	C	200	100	100	0	25	100	8.0A	2.0	16A	15	E	1.0M	T
2N5630	S	N	2N5630	2N5629	AP	200W	C	200	120	120	0	20	80	8.0A	2.0	16A	15	E	1.0M	T
2N5631	S	N	2N5631	2N5629	AP	200W	C	200	140	140	0	15	60	8.0A	2.0	16A	15	E	1.0M	T
2N5632	S	N	2N5632	2N5632	AP	150W	C	200	100	100	0	25	100	5.0A	2.0	10A	15	E	1.0M	T
2N5633	S	N	2N5633	2N5632	AP	150W	C	200	120	120	0	20	180	5.0A	2.0	10A	15	E	1.0M	T
2N5634	S	N	2N5634	2N5632	AP	150W	C	200	140	140	0	15	60	5.0A	2.0	10A	15	E	1.0M	T
2N5635	S	N		2N5635	A	7.5W	C		60	35	0	5.0		100M					500M	T
2N5636	S	N		2N5635	A	15W	C		60	35	0	5.0		200M					450M	T
2N5637	S	N		2N5635	A	30W	C		60	35	0	5.0		500M					400M	T
2N5638 thru 2N5640	S	N			Field-Effect Transistors, see Table on Page 2-81															
2N5641	S	N		2N5641	A	15W	C		65	35	0	5.0		100M				300M	T	
2N5642	S	N		2N5641	A	30W	C		65	35	0	5.0		200M				250M	T	
2N5643	S	N		2N5641	A	60W	C		65	35	0	5.0		200M				200M	T	
2N5644	S	N		2N5644	AP	3.5W	C		36	18	0	15		100M				400M	T	
2N5645	S	N		2N5645	AP	12W	C		36	18	0	15		500M				400M	T	
2N5646	S	N		2N5646	AP	30W	C		36	18	0	15		1.0A				400M	T	
2N5647 thru 2N5649	S	N			Field-Effect Transistors, see Table on Page 2-81															
2N5650	S	N			AH	150M	A		20	15	0	30	300	3.0M				2.0G	T	
2N5651	S	N			AH	150M	A		20	15	0	30	300	3.0M				2.0G	T	
2N5652	S	N			AH	150M	A		20	15	0	30	300	3.0M				2.0G	T	
2N5653	S	N			Field-Effect Transistors, see Table on Page 2-81															
2N5654	S	N			Field-Effect Transistors, see Table on Page 2-81															
2N5655	S	N	2N5655	2N5655	AP	20W	C	150	275	250	0	30	250	100M	1.0	100M	20	E		
2N5656	S	N	2N5656	2N5655	AP	20W	C	150	325	300	0	30	250	100M	1.0	100M	20	E		
2N5657	S	N	2N5657	2N5655	AP	20W	C	150	375	350	0	30	250	100M	1.0	100M	20	E		
2N5658	S	N			SP	30W	C	200	120	80	0	50	150	5.0A	1.0	1.0A		30M	T	
2N5659	S	N			SP	30W	C	200	120	80	0	50	150	5.0A	1.0	1.0A		30M	T	
2N5660	S	N	2N6233	2N6233	SP			200	250	200	0	40	150	500M	0.4	1.0A		20M	T	
2N5661	S	N	2N6234	2N6233	SP			200	400	300	0	40	150	500M	0.4	1.0A		20M	T	
2N5662	S	N			SP			200	250	200	0	40	150	500M	0.4	1.0A		20M	T	
2N5663	S	N			SP			200	400	300	0	40	150	500M	0.4	1.0A		20M	T	
2N5664	S	N	2N6233	2N6233	SP			200	250	200	0	40	120	1.0A	0.4	3.0A		20M	T	



2N5665-2N5764

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE—</sub>	Subscript	f <sub>T</sub> Units	Subscript	
2N5665	S	N	2N6234	2N6233	SP			200	400	300	0	40	120	1.0A	0.4	3.0A		20M	T	
2N5666	S	N			SP			200	250	200	0	40	120	1.0A	0.4	3.0A		20M	T	
2N5667	S	N			SP			200	400	300	0	40	120	1.0A	0.4	3.0A		20M	T	
2N5668 thru 2N5670	Field-Effect Transistors, see Table on Page 2-81																			
2N5675	S	P			AP	1.0W	A	200	125	100	0	50	150	0.5A	2.0	2.0A	40	E		
2N5676	S	P			AP	2.0W	A	200	125	100	0	50	150	0.5A	2.0	2.0A	40	E		
2N5677	S	P			SP			200	125	100	0	30	90	5.0A	2.5	10A				
2N5678	S	P			SP			200	125	100	0	25	75	10A	3.0	20A				
2N5679	S	P	2N5679	2N5679	AP	10W	C	200	100	100	0	40	150	250M	0.6	250M	40	E	30M	
2N5680	S	P	2N5680	2N5679	AP	10W	C	200	120	120	0	40	150	250M	0.6	250M	40	E	30M	
2N5681	S	N	2N5681	2N5681	AP	10W	C	200	100	100	0	40	150	250M	0.6	250M	40	E	30M	
2N5682	S	N	2N5682	2N5681	AP	10W	C	200	120	120	0	40	150	250M	0.6	250M	40	E	30M	
2N5683	S	P	2N5683	2N5683	AP	300W	C	200	60	60	0	15	60	25A	5.0	50A	15	E	2.0M	
2N5684	S	P	2N5684	2N5683	AP	300W	C	200	80	80	0	15	60	25A	5.0	50A	15	E	2.0M	
2N5685	S	N	2N5685	2N5685	AP	300W	C	200	60	60	0	15	60	25A	5.0	50A	15	E	2.0M	
2N5686	S	N	2N5686	2N5685	AP	300W	C	200	80	80	0	15	60	25A	5.0	50A	15	E	2.0M	
2N5687	S	N			AP	5.0W	C		40	20	0	15		50M						
2N5688	S	N			AP	10W	C		40	20	0	15		50M						
2N5689	S	N			AP	25W	C		60	40	0	15		100M						
2N5690	S	N			AP	50W	C		50	30	0	10		100M						
2N5691	S	N			AP	88W	C		50	30	0	10		100M						
2N5692	G	P		2N5692	AP	125W	C	110	50	30	0	20	65	25A	0.75	60A		200M	T	
2N5693	G	P		2N5693	SP	125W	C	110	80	60	0	20	65	25A	0.75	60A		200M	T	
2N5694	G	P		2N5694	SP	125W	C	110	100	80	0	20	65	25A	0.75	60A		200M	T	
2N5695	G	P		2N5695	SP	125W	C	110	120	100	0	20	65	25A	0.75	60A		200M	T	
2N5696	G	P		2N5696	SP	125W	C	110	140	120	0	20	65	25A	0.75	60A		200M	T	
2N5697	S	N			AP	3.5W	C		40	18	0	30		40M						
2N5698	S	N			AP	5.0W	C		40	18	0	30		40M						
2N5699	S	N			AP	10W	C		40	18	0	15		50M						
2N5700	S	N			AP	35W	C		40	18	0	30		50M						
2N5701	S	N			AP	35W	C		40	18	0	30		50M						
2N5702	S	N			AP	880M	C		40	18	0	15		50M						
2N5703	S	N			AP	750M	C		40	18	0	15		50M						
2N5704	S	N			AP	25W	C		40	18	0	15		50M						
2N5705	S	N			AP	44W	C		36	18	0	15		100M						
2N5706	S	N			AP	80W	C		36	18	0	15		100M						
2N5707	S	N			AP	70W	S	200	70	50	0	5.0	50	100M			50M		T	
2N5708	S	N			AP	100W	S	200	70	50	0	5.0	50	100M			50M		T	
2N5709	S	N			AP	140W	S	200	70	50	0	5.0	50	200M			50M		T	
2N5710	S	N			AP	3.5W	C		40	20	0	20		10M						
2N5711	S	N			AP	10W	C		60	36	0	20		50M						
2N5712	S	N			AP	25W	C		60	40	0	10		100M						
2N5713	S	N			A	45W	C		60	40	0	10		10M						
2N5714	S	N			A	45W	C		60	40	0	10		10M						
2N5715	S	N			AP	6.0W	S		50	3.0	0	20	200	50M			3.5W		T	
2N5716 thru 2N5718	Field-Effect Transistors, see Table on Page 2-81																			
2N5729	S	N	2N5336	2N5336	SP			200	100	80	0	30	300	2.0A	1.5	5.0A	1.5	E	30M	
2N5730	S	N	2N5346	2N5346	SP			200	100	80	0	30	300	2.0A	1.2	5.0A	1.5	E	30M	
2N5731	S	N	2N5347	2N5346	SP			200	100	80	0	30	300	5.0A	1.5	10A	1.5	E	30M	
2N5732	S	N			SP			200	100	80	0	30	300	5.0A	1.2	10A	1.5	E	30M	
2N5733	S	N	MJ7000	MJ7000	SP			200	100	80	0	30	300	10A	1.2	20A	1.5	E	30M	
2N5734	S	N			SP			200	100	80	0	30	300	10A	1.2	20A	1.5	E	30M	
2N5735	S	N			SH	360M	A		60	30	0	40	120	150M	0.4	150M		200M	T	
2N5736	S	N			SH	360M	A		60	30	0	100	300	150M	0.4	150M		200M	T	
2N5737	S	P			AP			200	60	60	0	20	80	5.0A	0.5	5.0A	20	E	10M	
2N5738	S	P			AP			200	100	100	0	20	80	5.0A	0.5	5.0A	20	E	10M	
2N5739	S	P			AP			200	60	60	0	20	80	5.0A	0.5	5.0A	20	E	10M	
2N5740	S	P			AP			200	100	100	0	20	80	5.0A	0.5	5.0A	20	E	10M	
2N5741	S	P			AP			200	60	60	0	20	80	10A	1.5	10A	20	E	10M	
2N5742	S	P			AP			200	100	100	0	20	80	10A	1.5	10A	20	E	10M	
2N5743	S	P			AP			200	60	60	0	20	80	10A	1.5	10A	20	E	10M	
2N5744	S	P			AP			200	100	100	0	20	80	10A	1.5	10A	20	E	10M	
2N5745	S	P	2N5745	2N5745	AP	200W	C	200	80	80	0	15	60	10A	1.0	10A	40	E	2.0M	
2N5754 thru 2N5757	Thyristors, See Table on Page 2-70																			
2N5758	S	N	2N5758	2N5758	AP	150W	C	200	100	100	0	25	100	3.0A	1.0	3.0A	15	E	1.0M	
2N5759	S	N	2N5759	2N5758	AP	150W	C	200	120	120	0	20	80	3.0A	1.0	3.0A	15	E	1.0M	
2N5760	S	N	2N5760	2N5758	AP	150W	C	200	140	140	0	15	60	3.0A	1.0	3.0A	15	E	1.0M	
2N5761	S	N			AH	250M	A		20	15	0	30	300	10M			18.5			
2N5762	S	N			AH	300M	A		20	15	0	30	300	15M			16.5			
2N5763	S	P			SP	400M	A		65	60	0	70		10M	0.4	150M		200M	T	
2N5764	S	N			AH	10W	S		55	25	0	20		0.10A						



## 2N5765-2N5870

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub> —	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Subscript			
						@ 25°C	°C	(volts)	(volts)	(min)		(max)	Units	(volts)	Units		Units				
2N5765	S	N			AH	19W	S		55	25	0	20	0.10A								
2N5766	S	N			AH	5.0W	S		55	25	0	20	0.05A								
2N5767	S	N			AH	10W	S		55	25	0	20	0.10A								
2N5768	S	N			AH	20W	S		55	25	0	20	0.10A								
2N5777	S	N		2N5777	RD	200M	A	100	25	25	0										
2N5778	S	N		2N5777	RD	200M	A	100	40	40	0										
2N5779	S	N		2N5777	RD	200M	A	100	25	25	0										
2N5780	S	N		2N5777	RD	200M	A	100	40	40	0										
2N5781	S	P	2N3720	2N3719	AP	10W	C	200	80	80	R	4.0	3.2A	2.0	3.2A	25	E	8.0M	T		
2N5782	S	P	2N3720	2N3719	AP	10W	C	200	65	65	R	4.0	3.2A	2.0	3.2A	25	E	8.0M	T		
2N5783	S	P			AP	10W	C	200	45	45	R	4.0	3.2A	2.0	3.2A	25	E	8.0M	T		
2N5784	S	N			AP	10W	C	200	80	80	R	4.0	3.2A	2.0	3.2A	25	E	2.5M	T		
2N5785	S	N			AP	10W	C	200	65	65	R	4.0	3.2A	2.0	3.2A	25	E	2.5M	T		
2N5786	S	N			AP	10W	C	200	45	45	R	4.0	3.2A	2.0	3.2A	25	E	2.5M	T		
2N5793	S	N			SH	500M	A		75	40	0	40	150M	0.9	300M						
2N5794	S	N			SH	500M	A		75	40	0	100	300	150M	1.6	500M					
2N5795	S	N			SH	500M	A		60	60	0	40	120	150M	1.6	500M					
2N5796	S	N			SH	500M	A		60	60	0	100	300	150M	1.6	500M					
2N5797 thru 2N5803	Field-Effect Transistors, see Table on Page 2-81																				
2N5804	S	N			SP			200	300	300	X	10	100	5.0A	2.0	5.0A			15M	T	
2N5805	S	N			SP			200	375	375	X	10	100	5.0A	2.0	5.0A			15M	T	
2N5806 thru 2N5809	Thyristors, See Table on Page 2-70																				
2N5810	S	N			A	500M	A	135	35	25	0	60	200	2.0M	0.75	500M					
2N5811	S	N			A	500M	A	135	35	25	0	60	200	2.0M	0.75	500M					
2N5812	S	N			A	500M	A	135	35	25	0	150	500	2.0M	0.75	500M					
2N5813	S	P			A	500M	A	135	35	25	0	150	500	2.0M	0.75	500M					
2N5814	S	N			A	500M	A	135	50	40	0	60	120	2.0M	0.75	500M					
2N5815	S	P			A	500M	A	135	50	40	0	60	120	2.0M	0.75	500M					
2N5816	S	N			A	500M	A	135	50	40	0	100	200	2.0M	0.75	500M					
2N5817	S	P			A	500M	A	135	50	40	0	100	200	2.0M	0.75	500M					
2N5818	S	N			A	500M	A	135	50	40	0	150	300	2.0M	0.75	500M					
2N5819	S	P			A	500M	A	135	50	40	0	150	300	2.0M	0.75	500M					
2N5820	S	N			A	500M	A	135	70	60	0	60	120	2.0M	0.75	500M					
2N5821	S	P			A	500M	A	135	70	60	0	60	120	2.0M	0.75	500M					
2N5822	S	N			A	500M	A	135	70	60	0	100	200	2.0M	0.75	500M					
2N5823	S	P			A	500M	A	135	70	60	0	100	200	2.0M	0.75	500M					
2N5824	S	N			A	360M	A	125	50	40	0	60	120	2.0M	0.125	10M	60	E			
2N5825	S	N			A	360M	A	125	50	40	0	100	200	2.0M	0.125	10M	100	E			
2N5826	S	N			A	360M	A	125	50	40	0	150	300	2.0M							
2N5827	S	N			A	360M	A	125	50	40	0	250	500	2.0M							
2N5828	S	N			A	360M	A	125	50	40	0	400	800	2.0M							
2N5829	S	P		2N5829	AH	200M	A	125	30	30	0	20	150	2.0M							
2N5830	S	N			A	310M	A	135	120	100	0	80	500	10M	0.25	50M	60	E			
2N5831	S	N			A	310M	A	135	160	140	0	80	250	10M	0.25	50M	125	E			
2N5832	S	N			A	310M	A	135	160	140	0	175	500	10M	0.25	50M	50	E			
2N5833	S	N			A	310M	A	135	200	180	0	50	250	10M	0.25	50M					
2N5834	S	P			SP	5.0W	A														
2N5835	S	N		2N5835	SH	200M	A	125	15	10	0	25	10M								
2N5836	S	N		2N5835	SH	2.0W	C		15	10	0	25	50M								
2N5837	S	N		2N5835	SH	2.0W	C		10	5.0	0	25	100M								
2N5838	S	N	2N5838		SP			200	275	275	X	8.0	40	3.0A	1.0	3.0A	5.0	E			
2N5839	S	N	2N5839		SP			200	300	300	X	10	50	2.0A	1.5	2.0A	5.0	E			
2N5840	S	N	2N5840		SP			200	375	375	X	10	50	2.0A	1.5	2.0A	5.0	E			
2N5841	S	N		2N5841	SH	350M	C														
2N5842	S	N		2N5841	SH	350M	C														
2N5843	S	P			AM	500M	A		50	40	0	50	150	0.1M							
2N5844	S	P			AM	500M	A		50	40	0	100	300	0.1M							
2N5845	S	N			S	1.2W	C		50	40	0	25	150	500M	0.6	500M			100M	T	
2N5845A	S	N			S	1.2W	C		50	40	0	35	150	500M	0.5	500M			250M	T	
2N5846	S	N		2N5846	AH	10W	C		36	18	0	5.0		250M							
2N5847	S	N		2N5846	AW	20W	C		48	24	0	3.0		1.2A							
2N5848	S	N		2N5848	AP	50W	C		48	24	0	3.0		2.4A							
2N5849	S	N		2N5849	AP	100W	C		30	15	0	40		10M					800M	T	
2N5851	S	N			S	500M	C		30	15	0	40		10M					1100M	T	
2N5852	S	N			S	500M	C		30	15	0	40		10M					15M	T	
2N5853	S	P			AP	66W	C	200	100	80	0	30	90	5.0A	0.9	5.0A	20	E	20M	T	
2N5854	S	N			AP	66W	C	200	100	80	0	30	90	5.0A	0.9	5.0A	20	E	20M	T	
2N5855	S	P			A	750M	A		60	60	0	50	300	150M	0.4	150M	1.0	E			
2N5856	S	N			A	750M	A		60	60	0	50	300	150M	0.4	150M	1.0	E			
2N5857	S	P			A	750M	A		80	80	0	50	300	150M	0.4	150M	1.0	E			
2N5858	S	N			A	750M	A		80	80	0	50	300	150M	0.4	150M	1.0	E			
2N5862	S	N		2N5862		80W	A	200	65	35	0	5.0		3.0A							
2N5864	S	P		2N5864	A	1.25W	A		90	70	0	50	500	150M	0.9	300M	50	E	50M	T	
2N5865	S	P		2N5865	A	1.25W	A		70	50	0	40	200	150M	1.25	500M			100M	T	
2N5867	S	P	2N5867	2N5867	AP	87.5W	C	200	60	60	0	20	100	1.5A	2.0	5.0A	20	E	4.0M	T	
2N5868	S	P	2N5868	2N5867	AP	87.5W	C	200	80	80	0	20	100	1.5A	2.0	5.0A	20	E	4.0M	T	
2N5869	S	N	2N5869	2N5867	AP	87.5W	C	200	60	60	0	20	100	1.5A	2.0	5.0A	20	E	4.0M	T	
2N5870	S	N	2N5870	2N5867	AP	87.5W	C	200	80	80	0	20	100	1.5A	2.0	5.0A	20	E	4.0M	T	



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						$P_D$ @ 25°C * 100°C	$T_J$	$V_{CB}$	$V_{CE-}$	$I_{S_{subscript}}$	$h_{FE}$ @ $I_C$	$V_{CE(SAT)}$ @ $I_C$	$h_{f-}$	$f_{subscript}$	$I_{subscript}$	$I_{subscript}$					
						Ref Point	°C	(volts)	(volts)		(min) (max)	Units (volts)	Units				Units				
2N5871	S	P	2N5871	2N5871	AP	100W	C	200	60	60	0	20	100	2.5A	2.0	7.0A	20	E	4.0M	T	T
2N5872	S	P	2N5872	2N5871	AP	100W	C	200	80	80	0	20	100	2.5A	2.0	7.0A	20	E	4.0M	T	T
2N5873	S	N	2N5873	2N5871	AP	100W	C	200	60	60	0	20	100	2.5A	2.0	7.0A	20	E	4.0M	T	T
2N5874	S	N	2N5874	2N5871	AP	100W	C	200	80	80	0	20	100	2.5A	2.0	7.0A	20	E	4.0M	T	T
2N5875	S	P	2N5875	2N5875	AP	150W	C	200	60	60	0	20	100	4.0A	3.0	10A	20	E	4.0M	T	T
2N5876	S	P	2N5876	2N5875	AP	150W	C	200	80	80	0	20	100	4.0A	3.0	10A	20	E	4.0M	T	T
2N5877	S	N	2N5877	2N5875	AP	150W	C	200	60	60	0	20	100	4.0A	3.0	10A	20	E	4.0M	T	T
2N5878	S	N	2N5878	2N5875	AP	150W	C	200	80	80	0	20	100	4.0A	3.0	10A	20	E	4.0M	T	T
2N5879	S	P	2N5879	2N5879	AP	160W	C	200	60	60	0	20	100	6.0A	4.0	12A	20	E	4.0M	T	T
2N5880	S	P	2N5880	2N5879	AP	160W	C	200	80	80	0	20	100	6.0A	4.0	12A	20	E	4.0M	T	T
2N5881	S	N	2N5881	2N5879	AP	160W	C	200	60	60	0	20	100	6.0A	4.0	12A	20	E	4.0M	T	T
2N5882	S	N	2N5882	2N5879	AP	160W	C	200	80	80	0	20	100	6.0A	4.0	12A	20	E	4.0M	T	T
2N5883	S	P	2N5883	2N5883	AP	200W	C	200	60	60	0	20	100	10A	4.0	20A	20	E	4.0M	T	T
2N5884	S	P	2N5884	2N5883	AP	200W	C	200	80	80	0	20	100	10A	4.0	20A	20	E	4.0M	T	T
2N5885	S	N	2N5885	2N5883	AP	200W	C	200	60	60	0	20	100	10A	4.0	20A	20	E	4.0M	T	T
2N5886	S	N	2N5886	2N5883	AP	200W	C	200	80	80	0	20	100	10A	4.0	20A	20	E	4.0M	T	T
2N5887	G	P	2N5887	2N5887	AP	57W	C	110	20	15	0	15	350	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5888	G	P	2N5888	2N5887	AP	57W	C	110	30	25	0	15	350	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5889	G	P	2N5889	2N5887	AP	57W	C	110	30	25	0	30	70	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5890	G	P	2N5890	2N5887	AP	57W	C	110	45	35	0	30	70	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5891	G	P	2N5891	2N5877	AP	57W	C	110	60	45	0	30	70	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5892	G	P	2N5892	2N5877	AP	57W	C	110	75	60	0	30	70	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5893	G	P	2N5893	2N5877	AP	57W	C	110	30	25	0	60	120	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5894	G	P	2N5894	2N5877	AP	57W	C	110	45	35	0	60	120	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5895	G	P	2N5895	2N5877	AP	57W	C	110	60	45	0	60	120	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5896	G	P	2N5896	2N5877	AP	57W	C	110	75	60	0	60	120	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5897	G	P	2N5897	2N5877	AP	57W	C	110	30	25	0	100	200	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5898	G	P	2N5898	2N5877	AP	57W	C	110	45	35	0	100	200	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5899	G	P	2N5899	2N5877	AP	57W	C	110	60	45	0	100	200	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5900	G	P	2N5900	2N5877	AP	57W	C	110	75	60	0	100	200	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5901	G	P	2N5901	2N5877	AP	57W	C	110	30	25	0	175	350	0.5A	0.35	5.0A	12.5	E	0.25M	T	T
2N5902 thru 2N5909			Field-Effect Transistors, see Table on Page 2-81																		
2N5913	S	N			AH		C		36	14	0										
2N5914	S	N			AH		C		36	14	0										
2N5915	S	N			AH		C		36	14	0										
2N5916	S	N			AH		C		55	24	0	20			50M						
2N5917	S	N			AH		C		55	24	0	20			50M						
2N5918	S	N			AH		C		60	24	0										
2N5919	S	N			AH		C		65	30	0										
2N5920	S	N			AH		C		50	50	R										
2N5921	S	N			AH		C		50	50	R										
2N5926	S	N			SP	14.5W *200W	C	200	150	120	0	10	40	50A	0.6	50A					
2N5927	S	N			SP	*200W	C	200	150	120	0	10	40	70A	0.75	70A					
2N5928	S	N			SP	*200W	C	200	120	120	0	10	40	100A	1.0	100A					
2N5929	S	N			SP	100W	C	200	90	80	X	20	100	10A	2.0	10A		30M	T	T	
2N5930	S	N			SP	100W	C	200	130	120	X	20	100	10A	2.0	10A		30M	T	T	
2N5931	S	N			SP	100W	C	200	170	160	X	20	100	10A	2.0	10A		30M	T	T	
2N5932	S	N			SP	100W	C	200	70	60	X	20	100	10A	2.0	10A		30M	T	T	
2N5933	S	N			SP	100W	C	200	110	100	X	20	100	20A	2.0	20A		30M	T	T	
2N5934	S	N			SP	100W	C	200	150	140	X	20	100	20A	2.0	20A		30M	T	T	
2N5935	S	N			SP	100W	C	200	90	80	X	20	100	30A	2.0	30A		30M	T	T	
2N5936	S	N			SP	100W	C	200	130	120	X	20	100	30A	2.0	30A		30M	T	T	
2N5937	S	N			SP	100W	C	200	70	160	X	20	100	30A	2.0	30A		30M	T	T	
2N5938	S	N			AP	2.5W	A	200	60	50	0	30	150	1.0A	0.75	3.0A	20	E			
2N5939	S	N			AP	2.0W	A	200	80	80	0	40	200	5.0A	1.0	10A	30	E			
2N5940	S	N			AP	2.0W	A	200	70	70	0	40	200	5.0A	1.0	10A	30	E			
2N5941	S	N		2N5941	AH	80W	C		65	35	0	10		0.500A				50M	T	T	
2N5942	S	N		2N5941	AH	140W	C		65	35	0	10		1.0A				50M	T	T	
2N5943	S	N		2N5943	A	3.5W	C		40	30	0	25	300	50M	0.2	100M	25	E			
2N5944	S	N		2N5944	AP	5.0W	C		36	16	0	20		0.1A							
2N5945	S	N		2N5944	AP	15W	C		36	16	0	20		0.2A							
2N5946	S	N		2N5944	AP	37.5W	C		36	16	0	20		0.5A							
2N5947	S	N		2N5947	A	16W	C		40	30	0	25	250	75M	0.35	200M	25	E			
2N5949 thru 2N5953			Field Effect Transistors, See Table on Page 2-81																		
2N5954	S	P			AP	40W	C	200	90	85	R	20	100	2.0A	2.0	6.0A	2.5K	E	5.0M	T	T
2N5955	S	P			AP	40W	C	200	70	65	R	20	100	2.5A	2.0	6.0A	2.5K	E	5.0M	T	T
2N5956	S	P			AP	40W	C	200	50	45	R	20	100	3.0A	2.0	6.0A	2.5K	E	5.0M	T	T
2N5961	S	N			AH	625M	A		60	60	0	150	700	10M	0.2	10M	150	E	100M	T	T
2N5962	S	N			AH	625M	A		45	45	0	600	1.4K	10M	0.2	10M	600	E	100M	T	T
2N5963	S	N			AH	625M	A		30	30	0	1.2K	2.2K	10M	0.2	10M	1200	E	150M	T	T
2N5964	S	N			AH	700M	A	135	160	150	0	50	250	10M	0.2	10M	50	E	100M	T	T
2N5965	S	N			AH	700M	A	135	200	180	0	50	250	10M	0.2	10M	50	E	100M	T	T
2N5970	S	N	2N5970		SP	*85.5W	C	200	80	60	0	20	60	5.0A	1.0	5.0A		4.0M	T	T	
2N5971	S	N	2N5971		SP	*85.5W	C	200	80	60	0	50	150	5.0A	0.7	5.0A		4.0M	T	T	
2N5972	S	N	2N5972		SP	*85.5W	C	200	100	70	0	25	75	5.0A	1.0	5.0A		4.0M	T	T	
2N5973	S	N	2N5973		SP	*85.5W	C	200	120	80	0	25	75	0.5A	1.0	5.0A		4.0M	T	T	
2N5974	S	P			AP	75W	C	150	60	40	0	20	120	2.							



2N5986-2N6090

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C * @ 75°C * @ 100°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE—</sub> (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE—</sub>	Subscript	f <sub>T</sub> Units	Subscript		
												(min)	(max)	Units	(volts)					Units	
2N5986	S	P			AP	100W	C	150	60	40	0	20	120	6.0A	0.7	6.0A	20	E	2.0M	T	
2N5987	S	P			AP	100W	C	150	80	60	0	20	120	6.0A	0.7	6.0A	20	E	2.0M	T	
2N5988	S	P			AP	100W	C	150	100	80	0	20	120	6.0A	0.7	6.0A	20	E	2.0M	T	
2N5989	S	N			AP	100W	C	150	60	40	0	20	120	6.0A	0.7	6.0A	20	E	2.0M	T	
2N5990	S	N			AP	100W	C	150	80	60	0	20	120	6.0A	0.7	6.0A	20	E	2.0M	T	
2N5991	S	N			AP	100W	C	150	100	80	0	20	120	6.0A	0.7	6.0A	20	E	2.0M	T	
2N5992	S	N			AP	35.7W	C		65	30	0										
2N5993	S	N			AP	35.7W	C		36	18	0										
2N5994	S	N			AP	35.7W	C		65	30	0										
2N5995	S	N			AP	10.7W	C		36	14	0										
2N5996	S	N			AP	35.7W	C		36	18	0										
2N6000	S	N			A	800M	C	125	35	25	0	100	300	10M	0.080	10M	70	E	350M	T	
2N6001	S	P			A	800M	C	125	35	25	0	100	300	10M	0.100	10M	85	E	700M	T	
2N6002	S	N			A	800M	C	125	35	25	0	250	500	10M	0.080	10M	175	E	450M	T	
2N6003	S	P			A	800M	C	125	35	25	0	250	500	10M	0.100	10M	235	E	800M	T	
2N6004	S	N			A	800M	C	125	50	40	0	100	300	10M	0.080	10M	70	E	350M	T	
2N6005	S	P			A	800M	C	125	50	40	0	100	300	10M	0.100	10M	85	E	700M	T	
2N6006	S	N			A	800M	C	125	50	40	0	250	500	10M	0.080	10M	175	E	450M	T	
2N6007	S	P			A	800M	C	125	50	40	0	250	500	10M	0.200	10M	235	E	800M	T	
2N6010	S	N			A	1.0W	C	150	50	40	0	100	300	10M	0.050	10M	65	E	330M	T	
2N6011	S	P			A	1.0W	C	150	50	40	0	100	300	10M	0.080	10M	90	E	240M	T	
2N6012	S	P			A	1.0W	C	150	50	40	0	250	500	10M	0.050	10M	155	E	420M	T	
2N6013	S	P			A	1.0W	C	150	50	40	0	250	500	10M	0.080	10M	225	E	360M	T	
2N6014	S	N			A	1.0W	C	150	70	60	0	100	300	10M	0.050	10M	65	E	330M	T	
2N6015	S	P			A	1.0W	C	150	70	60	0	100	300	10M	0.080	10M	90	E	240M	T	
2N6016	S	N			A	1.0W	C	150	70	60	0	250	500	10M	0.050	10M	155	E	420M	T	
2N6017	S	P			A	1.0W	C	150	70	60	0	250	500	10M	0.080	10M	255	E	360M	T	
2N6021	S	P	2N4920	2N4918	A	36W	C	150	80	70	0	30	120	0.5A	1.0	0.5A	15	E	0.8M	T	
2N6022	S	P	2N4920	2N4918	A	36W	C	150	80	70	0	30	120	0.5A	1.0	0.5A	15	E	0.8M	T	
2N6023	S	P	2N4918	2N4918	A	36W	C	150	60	40	0	30	120	1.0A	1.0	1.0A	20	E	0.8M	T	
2N6024	S	P	2N4918	2N4918	A	36W	C	150	60	40	0	30	120	1.0A	1.0	1.0A	20	E	0.8M	T	
2N6025	S	P	2N4919	2N4918	A	36W	C	150	80	60	0	20	80	1.5A	1.0	1.5A	25	E	0.8M	T	
2N6026	S	P	2N4919	2N4918	A	36W	C	150	80	60	0	20	80	1.5A	1.0	1.5A	25	E	0.8M	T	
2N6027	Programmable Unijunctions, See Table on Page 2-67																				
2N6028	S	P			AP	200W	C	200	100	100	0	25	100	8.0A	2.0	16A	15	E	1.0M	T	
2N6029	S	P			AP	200W	C	200	100	100	0	25	100	8.0A	2.0	16A	15	E	1.0M	T	
2N6030	S	P			AP	200W	C	200	120	120	0	20	80	8.0A	2.0	16A	15	E	1.0M	T	
2N6031	S	P			AP	200W	C	200	140	140	0	15	60	8.0A	2.0	16A	15	E	1.0M	T	
2N6032	S	N			SP	*80W	C	200	120	90	0	10	50	50A	1.3	50A		E	50M	T	
2N6033	S	N			SP	*80W	C	200	150	120	0	10	50	40A	1.0	40A		E	50M	T	
2N6034	S	P			AP	40W	C	150	40	40	0	750	15k	2.0A	2.0	2.0A	500	E	25M	T	
2N6035	S	P			AP	40W	C	150	60	60	0	750	15k	2.0A	2.0	2.0A	500	E	25M	T	
2N6036	S	P			AP	40W	C	150	80	80	0	750	15k	2.0A	2.0	2.0A	500	E	25M	T	
2N6040	S	P			AP	75W	C	150	60	60	0	100	8.0A	4.0	8.0A	300	E	4.0M	T		
2N6041	S	P			AP	75W	C	150	80	80	0	100	8.0A	4.0	8.0A	300	E	4.0M	T		
2N6042	S	P			AP	75W	C	150	100	100	0	100	8.0A	4.0	8.0A	300	E	4.0M	T		
2N6043	S	N			AP	75W	C	150	60	60	0	100	8.0A	4.0	8.0A	300	E	4.0M	T		
2N6044	S	N			AP	75W	C	150	80	80	0	100	8.0A	4.0	8.0A	300	E	4.0M	T		
2N6045	S	N			AP	75W	C	150	100	100	0	100	8.0A	4.0	8.0A	300	E	4.0M	T		
2N6046	S	N			SP	114W	C	200	70	60	0	20	100	20A	2.0	20A		E	30M	T	
2N6047	S	N			SP	114W	C	200	110	100	0	20	100	20A	2.0	20A		E	30M	T	
2N6048	S	N			SP	114W	C	200	150	140	0	20	100	20A	2.0	20A		E	30M	T	
2N6049	S	P			AP	75W	C	200	90	55	0	25	100	500M	2.0	4.0A	25	E	3.0M	T	
2N6050	S	P			AP	150W	C	200	60	60	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6051	S	P			AP	150W	C	200	80	80	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6052	S	P			AP	150W	C	200	100	100	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6053	S	P			AP	150W	C	200	60	60	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6054	S	P			AP	150W	C	200	80	80	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6055	S	N			AP	100W	C	200	60	60	0	750	4.0A	2.0	4.0A	300	E	4.0M	T		
2N6056	S	N			AP	100W	C	200	80	80	0	750	4.0A	2.0	4.0A	300	E	4.0M	T		
2N6057	S	N			AP	150W	C	200	60	60	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6058	S	N			AP	150W	C	200	80	80	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6059	S	N			AP	150W	C	200	100	100	0	750	18k	6.0A	2.0	6.0A	300	E	4.0M	T	
2N6060	S	N			AP	*150W	C	200	100	100	0	20	120	20A	1.0	20A	40	E	10M	T	
2N6061	S	P			AP	*150W	C	200	100	100	0	20	120	20A	1.1	20A	40	E	20M	T	
2N6062	S	N			AP	*150W	C	200	100	100	0	20	120	20A	1.0	20A	40	E	10M	T	
2N6063	S	P			AP	*150W	C	200	100	100	0	20	120	20A	1.1	20A	40	E	20M	T	
2N6064	G	P	2N6064	2N6064	SP	56 W	C	110	80	80	0	20	50	3.0 A	0.8	10 A	10	E			
2N6065	G	P	2N6065	2N6064	SP	56 W	C	110	120	120	0	20	50	3.0 A	0.8	10 A	10	E			
2N6066	G	P	2N6066	2N6064	S	56 W	C	110	160	160	0	20	50	3.0 A	0.8	10 A	10	E			
2N6067	S	P			S	625M	A		50	40	0	50	200	100 M	0.3	100 M		E	150 M	T	
2N6068	Thyristors, See Table on Page 2-70																				
2N6075	Thyristors, see Table on Page 2-70																				
2N6068A	Thyristors, see Table on Page 2-70																				
2N6075A	S	P			A	360M	A		25	25	0	100	500	10M	0.25	10M					
2N6077	S	N	2N6077		SP	**25.7W	C	200	300	300	X	12	70	1.2A	0.5	1.2A		1.0M	T		
2N6078	S	N	2N6078		SP	**25.7W	C	200	275	275	X	12	70	1.2A	0.5	1.2A		1.0M	T		
2N6079	S	N	2N6079		SP	**25.7W	C	200	375	375	X	12	50	1.2A	0.5	1.2A		1.0M	T		
2N6080	S	N			A	12W	C		36	18	0	5.0		0.25A							
2N6081	S	N			A	13W	C		36	18	0	5.0		0.5A							
2N6082	S</																				



TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						$P_D$ @ 25°C * @ 75°C * @ 100°C	Rel Point	$T_J$ °C	$V_{CB}$ (volts)	$V_{CE}$ — (volts)	Subscript	$h_{FE}$ @ $I_C$	$V_{CE(SAT)}$ @ $I_C$	$h_{FE}$	Subscript	$f_t$	Subscript			
						W	°C				(min) (max)	Units	(volts)	Units	Units	Units				
2N6091	S	N			A	0.75W	C	60	60	0	60	240	10 *	0.35	1.0 M			60 M	T	
2N6092	S	N			AH	0.75W	C	60	60	0	150	600	10 *	0.35	1.0 M			60 M	T	
2N6093	S	N			AH	*83.3 W	C	70	35	0	20		5.0 A					100 M	T	
2N6094	S	P			AP	8.0W	C	36	18	0	5.0		0.25A							
2N6095	S	P			AP	20W	C	36	18	0	15		0.5A							
2N6096	S	P			AP	40W	C	36	18	0	15		0.5A							
2N6097	S	P			AP	60W	C	36	18	0	15		0.5A							
2N6098	S	N	2N5983	2N5983	AP	75 W	C	150	70	60	0	20	80	4.0 A	2.5	10 A	15	E	0.8 M	T
2N6099	S	N	2N5983	2N5983	AP	75 W	C	150	70	60	0	20	80	4.0 A	2.5	10 A	15	E	0.8 M	T
2N6100	S	N	2N5991	2N5986	AP	75 W	C	150	80	70	0	20	80	5.0 A	2.5	10 A	15	E	0.8 M	T
2N6101	S	N	2N5991	2N5986	AP	75 W	C	150	80	70	0	20	80	5.0 A	2.5	10 A	15	E	0.8 M	T
2N6102	S	N			AP	75 W	C	150	45	40	0	15	60	8.0 A	2.5	16 A	15	E	0.8 M	T
2N6103	S	N			AP	75 W	C	150	45	40	0	15	60	8.0 A	2.5	16 A	15	E	0.8 M	T
2N6104	S	N			AH	*36 W	C		65	30	0									
2N6105	S	N			AH	*36 W	C		65	30	0									
2N6106	S	P			A	40 W	C	150	80	70	0	30	150	2.0 A	2.0	6.5 A	20	E	10 M	E
2N6107	S	P			A	40 W	C	150	80	70	0	30	150	2.0 A	2.0	6.5 A	20	E	10 M	E
2N6108	S	P			A	40 W	C	150	60	50	0	30	150	2.5 A	2.0	6.5 A	20	E	10 M	E
2N6109	S	P			A	40 W	C	150	60	50	0	30	150	2.5 A	2.0	6.5 A	20	E	10 M	E
2N6110	S	P			A	40 W	C	150	40	30	0	30	150	3.0 A	2.0	6.5 A	20	E	10 M	E
2N6111	S	P			A	40 W	C	150	40	30	0	30	150	3.0 A	2.0	6.5 A	20	E	10 M	E
2N6112	S	N			AH	360M	C		50	30	0	185	600	2.0M	0.3	10M	185	E	160M	T
2N6116	thru Programmable Unijunction Transistors, See Table on Page 2-87																			
2N6120																				
2N6121	S	N			AP	40W	C	150	45	45	0	25	100	1.5A	0.6	1.5A	25	E	2.5M	T
2N6122	S	N			AP	40W	C	150	60	60	0	25	100	1.5A	0.6	1.5A	25	E	2.5M	T
2N6123	S	N			AP	40W	C	150	80	80	0	20	80	1.5A	0.6	1.5A	25	E	2.5M	T
2N6124	S	P			AP	40W	C	150	45	45	0	25	100	1.5A	0.6	1.5A	25	E	2.5M	T
2N6125	S	P			AP	40W	C	150	60	60	0	25	100	1.5A	0.6	1.5A	25	E	2.5M	T
2N6126	S	P			AP	40W	C	150	80	80	0	20	80	1.5A	0.6	1.5A	25	E	2.5M	T
2N6127	S	P			AP	*67W	C	200	100	80	0	30	120	5.0A	2.2	10A	20	E	40M	T
2N6128	S	N			AP	*67W	C	200	100	80	0	30	120	5.0A	2.2	10A	20	E	50M	T
2N6129	S	N			AP	50W	C	150	40	40	0	20	100	2.5A	1.4	7.0A	25	E	2.5M	T
2N6130	S	N			AP	50W	C	150	60	60	0	20	100	2.5A	1.4	7.0A	25	E	2.5M	T
2N6131	S	N			AP	50W	C	150	80	80	0	20	100	2.5A	2.0	7.0A	25	E	2.5M	T
2N6132	S	P			AP	50W	C	150	40	40	0	20	100	2.5A	1.4	7.0A	25	E	2.5M	T
2N6133	S	P			AP	50W	C	150	60	60	0	20	100	2.5A	1.4	7.0A	25	E	2.5M	T
2N6134	S	P			AP	50W	C	150	80	80	0	20	100	2.5A	1.8	7.0A	25	E	2.5M	T
2N6135	S	N			AH	5.0W	C		35	25	0	25	250	80M						
2N6136	S	N	2N6136		AH	60W	C		36	18	0	20		1.0A					1.1G	T
2N6137	Programmable Unijunction Transistors, See Table on Page																			
2N6138																				
2N6139	thru 2N6165 Thyristors, see Table on Page 2-70																			
2N6166	S	N			AH	117W	C		65	35	0	5.0		500M						
2N6167	thru 2N6174 Thyristors, see Table on Page 2-70																			
2N6175	S	N			AP	20W	C		300	250	0	30		20M						
2N6176	S	N			AP	20W	C		350	300	0	30		20M						
2N6177	S	N			AP	20W	C		450	350	0	30		50M						
2N6178	S	N			SP	*10W	C	150	100	75	X	30	130	0.5A	0.5	0.5A	25	E	21M	T
2N6179	S	N			SP	*10W	C	150	75	50	X	40	250	0.5A	0.8	0.5A	25	E	21M	T
2N6180	S	P			SP	*10W	C	150	100	75	X	30	130	0.5A	0.7	0.5A	25	E	50M	T
2N6181	S	P			SP	*10W	C	150	75	50	X	40	250	0.5A	1.2	0.5A	25	E	50M	T
2N6182	S	P			SP	60W	C	200	80	80	0	30	120	2.0A	0.7	2.0A	30M	E	30M	T
2N6183	S	P			SP	60W	C	200	80	80	0	60	240	2.0A	0.7	2.0A	30M	E	30M	T
2N6184	S	P			SP	60W	C	200	100	100	0	30	120	2.0A	0.7	2.0A	30M	E	30M	T
2N6185	S	P			SP	60W	C	200	100	100	0	60	240	2.0A	0.7	2.0A	30M	E	30M	T
2N6197	S	N			AHP	10W	C		60	35	0									
2N6198	S	N			AHP	25W	C		60	35	0									
2N6199	S	N			AHP	50W	C		60	35	0									
2N6200	S	N			AHP	85W	C		60	35	0									
2N6201	S	N			AHP	140W	C		60	35	0									
2N6202	S	N			AHP	10W	C		60	33	0									
2N6203	S	N			AHP	20W	C		60	33	0									
2N6204	S	N			AHP	40W	C		60	33	0									
2N6205	S	N			AHP	80W	C		60	33	0									
2N6206	S	N			AHP	10W	C		50	30	0									
2N6207	S	N			AHP	20W	C		50	30	0									
2N6208	S	N			AHP	40W	C		50	30	0									
2N6211	S	P			SP	*20W	C	200	275	275	X	10	100	1.0A	1.4	1.0A			5.0M	T
2N6212	S	P			SP	*20W	C	200	350	350	X	10	100	1.0A	1.6	1.0A			5.0M	T
2N6213	S	P			SP	*20W	C	200	400	400	X	10	100	1.0A	2.0	1.0A			5.0M	T
2N6214	S	P			SP	20W	C	200	450	450	X	10	100	1.0A	2.5	1.0A			20M	T
2N6215	S	N			SP	*125W	C	200	100	80	X	25	150	25A	0.8	25A			20M	T
2N6216	S	N			AP	*71.4W	C	200	200	200	0	20	80	5.0A	0.5	5.0A	20	E	20M	T
2N6217	S	N			AP	*71.4W	C	200	140	80	0	20	80	5.0A	0.5	5.0A	20	E	20M	T
2N6226	S	P			AP	150W	C	200	100	100	0	25	100	3.0A	1.0	3.0A	15	E	1.0M	T
2N6227	S	P			AP	150W	C	200	120	120	0	20	80	3.0A	1.0	3.0A	15	E	1.0M	T
2N6228	S	P			AP	150W	C	200	140	140	0	15	60	3.0A	1.0	3.0A	15	E	1.0M	T
2N6229	S	P			AP	150W	C	200	100	100	0	25	100	5.0A	1.0	7.5A	15	E	1.0M	T
2N6230	S	P			AP	150W	C	200	120	120	0	20	80	5.0A	1.0	7.5A	15	E	1.0M	T
2N6231	S	P			AP	150W	C	200	140	140	0	15	60	5.0A	1.0	7.5A	15	E	1.0M	T
2N6233	S	N			SP	50W	C	200	250	225	0	25	125	1.0A	0.5	1.0A			20M	T
2N6234	S	N			SP	50W	C	200	300	275	0	25	125	1.0A	0.5	1.0A			20M	T
2N6235	S	N			SP	50W	C	200	350	325	0	25	125	1.0A	0.5	1.0A			20M	T
2N6236	thru 2N6241 Thyristors, see Table on Page 2-70																			
2N6246	S	P			AP	125W	C	200	110	105	R		15A	2.5	15A	25	E	10M	T	
2N6247	S	P			AP	125W	C	200	90	85	R		15A	3.5	15A	25	E	10M	T	
2N6248	S	P			AP	125W	C	200	70	65	R		15A	3.5	15A	25	E	10M	T	
2N6249	S	N			SP	100W	C	200	300	225	X	X								



## 2

2-64



TYPE	MATERIAL	POLARITY	REPLACE- MENT	PAGE NUMBER	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>		Units	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Units
2N6382	S	P			SP	250W	C	200	140	120	O	30	120	20A	1.2	20A				30M	T
2N6383	S	N			AP	100W	C	200	40	40	X	1000	20K	5.0A	2.0	5.0A	1000	E		20M	T
2N6384	S	N			AP	100W	C	200	60	60	X	1000	20K	5.0A	2.0	5.0A	1000	E		20M	T
2N6385	S	N			AP	100W	C	200	80	80	X	1000	20K	5.0A	2.0	5.0A	1000	E		20M	T
2N6386	S	N			AP	40W	C	150	40	40	X	1000	20K	3.0A	2.0	3.0A	1000	E		20M	T
2N6387	S	N			AP	40W	C	150	60	80	X	1000	20K	5.0A	2.0	5.0A	1000	E		20M	T
2N6388	S	N			AP	40W	C	150	80	80	X	1000	20K	5.0A	2.0	5.0A	1000	E		20M	T
2N6394 thru 2N6405 Thyristors on Page 2-70																					



**3N22-3N120**

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> (volts)	V <sub>CE</sub> — (volts)	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	Units	h <sub>FE</sub> —	Subscript	f <sub>T</sub> —	Units	Subscript
3N22	S	N			AH	125M		85	15							0.96	B			
3N34	S	N				125M			30											
3N35	S	N				125M			30	30	0					25	E			
3N35A	S	N				125M			30	30	0					10	E			
3N39	Reference Amplifiers, see Table on Page 2-68																			
thru 3N44	G	P			SP	75W	C	100	60	35		30	120	5.0A	0.4	5.0A	30	E	600K	
3N45	G	P			SP	75W	C	100	80	50		20	80	5.0A	0.4	5.0A			300K	
3N46	G	P			SP	75W	C	100	40	25		30	120	5.0A	0.4	5.0A	30	E	500K	
3N47	G	P			SP	75W	C	100	60	40		20	80	5.0A	0.4	5.0A			300K	
3N48	G	P			SP	75W	C	100	60	40		30	120	5.0A	0.4	5.0A	30	E	600K	
3N49	G	P			SP	94W	C	100	60	35										
3N50	G	P			SP	94W	C	100	80	50		20	80	5.0A	0.4	5.0A			300K	
3N51	G	P			SP	94W	C	100	40	25		30	120	5.0A	0.4	5.0A	30	E	500K	
3N52	G	P			SP	94W	C	100	60	40		20	80	5.0A	0.4	5.0A			300K	
3N58	Thyristors, see Table on Page 2-70																			
thru 3N60					SC															
3N62	S	N			SC				10							V <sub>off</sub> = 200 μV				
3N63	S	N			SC				10							V <sub>off</sub> = 100 μV				
3N64	S	N			SC				10							V <sub>off</sub> = 50 μV				
3N65	S	N			SC											V <sub>off</sub> = 200 μV				
3N66	S	N			SC											V <sub>off</sub> = 100 μV				
3N67	S	N			SC											V <sub>off</sub> = 50 μV				
3N68	S	N			SC				10							V <sub>off</sub> = 200 μV				
3N68A	S	N			SC	100M	A	200	10											
3N69	S	N			SC				10							V <sub>off</sub> = 100 μV				
3N70	S	N			SC				10							V <sub>off</sub> = 50 μV				
3N71	S	N			SC	100M		200	15	8.0	0	40		2.0M		V <sub>off</sub> = 50 μV			100M	T
3N72	S	N			SC	100M		200	15	8.0	0	40		2.0M		V <sub>off</sub> = 100 μV			100M	T
3N73	S	N			SC	100M		200	15	8.0	0	40		2.0M		V <sub>off</sub> = 100 μV			100M	T
3N74	S	N			SC	300M		175	50							V <sub>off</sub> = 50 μV			30M	T
3N75	S	N			SC	300M		175	50							V <sub>off</sub> = 100 μV			30M	T
3N76	S	N			SC	300M		175	50							V <sub>off</sub> = 200 μV			30M	T
3N77	S	N			SC	300M		175	40							V <sub>off</sub> = 50 μV			30M	T
3N78	S	N			SC	200M		175	40							V <sub>off</sub> = 100 μV			30M	T
3N79	S	N			SC	300M		175	40							V <sub>off</sub> = 200 μV			30M	T
3N80	Thyristors, see Table on Page 2-70																			
thru 3N86					SC	200M	A		20	10	0	5.0		0.5M		V <sub>off</sub> = 50 μV			100M	T
3N87	S	N			SC	200M	A		20	10	0	5.0		0.5M		V <sub>off</sub> = 100 μV			100M	T
3N88	S	N			SC	200M	A		20	10	0	5.0		0.5M						
3N89	Field-Effect Transistors, see Table on Page 2-81																			
3N90	S	P			SC	300M	A	200	50							V <sub>off</sub> = 50 μV			6.0M	T
3N91	S	P			SC	300M	A	200	50							V <sub>off</sub> = 100 μV			6.0M	T
3N92	S	P			SC	300M	A	200	50							V <sub>off</sub> = 200 μV			6.0M	T
3N93	S	P			SC	300M	A	200	50							V <sub>off</sub> = 50 μV			6.0M	T
3N94	S	P			SC	300M	A	200	50							V <sub>off</sub> = 100 μV			6.0M	T
3N95	S	P			SC	300M	A	200	50							V <sub>off</sub> = 200 μV			6.0M	T
3N96	Field-Effect Transistors, see Table on Page 2-81																			
thru 3N99					SC	300M	A	200	20							V <sub>off</sub> = 50 μV				
3N100	S	P			SC	300M	A	200	30							V <sub>off</sub> = 50 μV				
3N101	S	P			SC	300M	A	200	30							V <sub>off</sub> = 50 μV				
3N102	S	P			SC	300M	A	200	40							V <sub>off</sub> = 50 μV				
3N103	S	P			SC	300M	A	200	50							V <sub>off</sub> = 50 μV				
3N104	S	P			SC	300M	A	200	60							V <sub>off</sub> = 50 μV				
3N105	S	P			SC	300M	A	200	20							V <sub>off</sub> = 250 μV				
3N106	S	P			SC	300M	A	200	40							V <sub>off</sub> = 250 μV				
3N107	S	P			SC	300M	A	200	60							V <sub>off</sub> = 250 μV				
3N108	S	P			SC	300M	A	200	50										12M	T
3N109	S	P			SC	300M	A	200	50										12M	T
3N110	S	P			SC	300M	A	200	50										12M	T
3N111	S	P			SC	300M	A	200	50										12M	T
3N112	S	P			SC	200M	A	200	50											
3N113	S	P			SC	200M	A	200	50											
3N114	S	P			SC	300M	A	200	30										12M	T
3N115	S	P			SC	300M	A	200	30										12M	T
3N116	S	P			SC	300M	A	200	30										12M	T
3N117	S	P			SC	300M	A	200	50										12M	T
3N118	S	P			SC	300M	A	200	50										12M	T
3N119	S	P			SC	300M	A	200	50										12M	T
3N120	S	N			SC	200M	A	200	30										12M	T



3N121-4N24

TYPE	MATERIAL	POLARITY	REPLACE- MENT	REF.	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P <sub>D</sub>	Ref Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE—</sub>	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>	h <sub>FE</sub>	Subscript	f <sub>T</sub>	Subscript			
						@ 25°C	°C	(volts)	(volts)	Subscript	(min)	(max)	Units	(volts)	Units	—	Subscript	Units	Subscript	
3N121 3N123 3N124 thru 3N126 3N127 3N128	S	N			SC	200M	A	125	30									40M	T	
	S	P			SC	100M	A	200	30									6.0M	E	
	Field-Effect Transistors, see Table on Page 2-81																			
3N127 3N128	S	N			SC	200M	A	200	30	20	0									
	Field-Effect Transistors, see Table on Page 2-81																			
3N129	S	P			SC	300M	A		20									2.0M	E	
3N130	S	P			SC	300M	A		30									2.0M	E	
3N131	S	P			SC	300M	A		40									2.0M	E	
3N132	S	P			SC	300M	A		50									2.0M	E	
3N133	S	P			SC	300M	A		60									2.0M	E	
3N134	S	P			SC	300M	A		20									2.0M	E	
3N135	S	P			SC	300M	A		40									2.0M	E	
3N136	S	P			SC	300M	A		60									2.0M	E	
3N138	Field-Effect Transistors, see Table on Page 2-81																			
thru 3N143 3N145	Field-Effect Transistors, see Table on Page 2-81																			
thru 3N186 3N188	Field-Effect Transistors, see Table on Page 2-81																			
thru 3N191	Field-Effect Transistors, see Table on Page 2-81																			
3N192	Field-Effect Transistors, see Table on Page 2-81																			
3N193	Field-Effect Transistors, see Table on Page 2-81																			
3N204	Field-Effect Transistors, see Table on Page 2-81																			
thru 3N206	Field-Effect Transistors, see Table on Page 2-81																			
3N207	Field-Effect Transistors, see Table on Page 2-81																			
3N208	Field-Effect Transistors, see Table on Page 2-81																			
3N211	Field-Effect Transistors, see Table on Page 2-81																			
thru 3N313	Field-Effect Transistors, see Table on Page 2-81																			
4N22 thru 4N24	Optoelectronic Devices, see Table on Page 2-90																			
	</																			



## REFERENCE AMPLIFIERS

### INDEX AND SHORT-FORM SPECIFICATIONS

This table contains a numerical listing and short-form specifications for reference amplifiers with EIA-registered 3N numbers. In addition, short-form specifications are also provided for special house numbered reference amplifiers.

#### KEY

TYPE	REF.	V <sub>REF</sub> (volts)	Tol ± %	<div>ΔV<sub>REF</sub> (volts)</div> <div>*TC (%/°C)</div>	I <sub>ZT</sub> (mA)	Z <sub>ZT</sub> (ohms)	T <sub>1</sub> °C	T <sub>2</sub> °C
Numerical Listing of Registered Type Numbers		Nominal Reference Voltage	Tolerance of Nominal Reference Voltage				Temperature Range over which ΔV <sub>REF</sub> is specified	
Reference device number indicates specific Data Sheet on which device is characterized.							*Maximum Operating Temperature	
Maximum Voltage Variation over the Temperature Range from T <sub>1</sub> to T <sub>2</sub>						Maximum Zener Impedance		
*Temperature Coefficient $\frac{\Delta V_1}{V} \frac{100}{(T_2 - T_1)}$						Zener Test Current		



## REFERENCE AMPLIFIER INDEX

3N39-MCA2234

TYPE	REF.	V <sub>REF</sub> (volts)	Tol ±%	$\Delta V_{REF}$ (volts)	I <sub>ZT</sub> (mA)	Z <sub>ZT</sub> (ohms)	T <sub>I</sub> °C	T <sub>2</sub> °C
				*TC (%/°C)				
3N39		9.0	9.0	0.005*	5.0			71*
3N40		9.0	9.0	0.003*	5.0			71*
3N41		9.0	9.0	0.002*	5.0			71*
3N42		9.0	9.0	0.005*	5.0			100*
3N43		9.0	9.0	0.003*	5.0			100*
3N44		9.0	9.0	0.002*	5.0			100*
3N44A		9.0	10	0.001*	5.0			150*
MCA1911	MCA1911	6.8	10	0.051	5.0	40	0	75
MCA1912	MCA1911	6.8	10	0.025	5.0	40	0	75
MCA1913	MCA1911	6.8	10	0.010	5.0	40	0	75
MCA1914	MCA1911	6.8	10	0.005	5.0	40	0	75
MCA1921	MCA1911	6.8	5.0	0.105	5.0	40	-55	100
MCA1922	MCA1911	6.8	5.0	0.052	5.0	40	-55	100
MCA1923	MCA1911	6.8	5.0	0.020	5.0	40	-55	100
MCA1924	MCA1911	6.8	5.0	0.010	5.0	40	-55	100
MCA1931	MCA1911	6.8	5.0	0.139	5.0	40	-55	150
MCA1932	MCA1911	6.8	5.0	0.069	5.0	40	-55	150
MCA1933	MCA1911	6.8	5.0	0.026	5.0	40	-55	150
MCA1934	MCA1911	6.8	5.0	0.013	5.0	40	-55	150
MCA2011	MCA1911	8.6	10	0.060	5.0	40	0	75
MCA2012	MCA1911	8.6	10	0.030	5.0	40	0	75
MCA2013	MCA1911	8.6	10	0.012	5.0	40	0	75
MCA2014	MCA1911	8.6	10	0.006	5.0	40	0	75
MCA2021	MCA1911	8.6	5.0	0.124	5.0	40	-55	100
MCA2022	MCA1911	8.6	5.0	0.062	5.0	40	-55	100
MCA2023	MCA1911	8.6	5.0	0.024	5.0	40	-55	100
MCA2024	MCA1911	8.6	5.0	0.012	5.0	40	-55	100
MCA2031	MCA1911	8.6	5.0	0.164	5.0	40	-55	150
MCA2032	MCA1911	8.6	5.0	0.082	5.0	40	-55	150
MCA2033	MCA1911	8.6	5.0	0.032	5.0	40	-55	150
MCA2034	MCA1911	8.6	5.0	0.016	5.0	40	-55	150
MCA2111	MCA1911	9.5	10	0.071	5.0	40	0	75
MCA2112	MCA1911	9.5	10	0.035	5.0	40	0	75
MCA2113	MCA1911	9.5	10	0.014	5.0	40	0	75
MCA2114	MCA1911	9.5	10	0.007	5.0	40	0	75
MCA2121	MCA1911	9.5	5.0	0.147	5.0	40	-55	100
MCA2122	MCA1911	9.5	5.0	0.073	5.0	40	-55	100
MCA2123	MCA1911	9.5	5.0	0.028	5.0	40	-55	100
MCA2124	MCA1911	9.5	5.0	0.014	5.0	40	-55	100
MCA2131	MCA1911	9.5	5.0	0.194	5.0	40	-55	150
MCA2132	MCA1911	9.5	5.0	0.097	5.0	40	-55	150
MCA2133	MCA1911	9.5	5.0	0.038	5.0	40	-55	150
MCA2134	MCA1911	9.5	5.0	0.019	5.0	40	-55	150
MCA2211	MCA1911	11.0	10	0.082	5.0	40	0	75
MCA2212	MCA1911	11.0	10	0.041	5.0	40	0	75
MCA2213	MCA1911	11.0	10	0.016	5.0	40	0	75
MCA2214	MCA1911	11.0	10	0.008	5.0	40	0	75
MCA2221	MCA1911	11.0	5.0	0.170	5.0	40	-55	100
MCA2222	MCA1911	11.0	5.0	0.085	5.0	40	-55	100
MCA2223	MCA1911	11.0	5.0	0.034	5.0	40	-55	100
MCA2224	MCA1911	11.0	5.0	0.017	5.0	40	-55	100
MCA2231	MCA1911	11.0	5.0	0.225	5.0	40	-55	150
MCA2232	MCA1911	11.0	5.0	0.112	5.0	40	-55	150
MCA2233	MCA1911	11.0	5.0	0.044	5.0	40	-55	150
MCA2234	MCA1911	11.0	5.0	0.022	5.0	40	-55	150



## THYRISTORS

This table contains a numerical listing and short-form specifications for thyristors with EIA-registered 2N and 3N numbers. Specific types of thyristors listed include silicon controlled rectifiers, gate-controlled switches, and silicon controlled switches.

### KEY

TYPE	REPLACE- MENT	REFERENCE	$I_T(\text{RMS})$ Amp	$V_{\text{DRM}}/V_{\text{RRM}}$ Volts	$T_J$ $T_C^{(1)}$ $^{\circ}\text{C}$	$I_{\text{GT}}$ mA	$V_{\text{GT}}$ Volts
Numerical Listing of Registered Type Numbers. *Device with gate turn-off characteristics	Type number of recommended replacement or of nearest electrical equivalent fully characterized in this book	Reference device number indicates specific Data Sheet on which device is characterized	On-State (RMS) Current	Peak Forward Blocking Voltage Peak Reverse Blocking Voltage	Maximum Junction Temperature, Maximum Case Temperature(1)	Gate Trigger Current	Gate Trigger Voltage



# THYRISTOR INDEX

2N681-2N1601

TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{ET}$ volts
2N681		2N681	25	25	125	40	2.0
2N681A		2N681	28	25	125	40	2.0
2N682		2N681	25	50	125	40	2.0
2N682A		2N681	28	50	125	40	2.0
2N683		2N681	25	100	125	40	2.0
2N683A		2N681	28	100	125	40	2.0
2N684		2N681	25	150	125	40	2.0
2N684A		2N681	28	150	125	40	2.0
2N685		2N681	25	200	125	40	2.0
2N685A		2N681	28	200	125	40	2.0
2N686		2N681	25	250	125	40	2.0
2N686A		2N681	28	250	125	40	2.0
2N687		2N681	25	300	125	40	2.0
2N687A		2N681	28	300	125	40	2.0
2N688		2N681	25	400	125	40	2.0
2N688A		2N681	28	400	125	40	2.0
2N689		2N681	25	500	125	40	2.0
2N689A		2N681	28	500	125	40	2.0
2N690		2N681	25	600	125	40	2.0
2N690A		2N681	25	600	125	40	2.0
2N691			25	700	125	40	2.0
2N692			25	800	125	40	2.0
2N764*			0.39	30	125	1.0	1.0
2N765*			0.20	60	125	1.0	1.0
2N766*			0.20	100	125	1.0	1.0
2N767*			0.20	200	125	1.0	1.0
2N876	2N4212	2N4212	0.35	15	150	0.2	0.8
2N877	2N4212	2N4212	0.35	30	150	0.2	0.8
2N878	2N4213	2N4212	0.35	60	150	0.2	0.8
2N879	2N4214	2N4212	0.35	100	150	0.2	0.8
2N880	2N4215	2N4212	0.35	150	150	0.2	0.8
2N881	2N4216	2N4212	0.35	200	150	0.2	0.8
2N882			0.35	300	150	0.2	0.8
2N883			0.35	400	150	0.2	0.8
2N884	2N4212	2N4212	0.35	15	150	0.02	0.6
2N885	2N4213	2N4212	0.35	30	150	0.02	0.6
2N886	2N4214	2N4212	0.35	60	150	0.02	0.6
2N887	2N4214	2N4212	0.35	100	150	0.02	0.6
2N888	2N4215	2N4212	0.35	150	150	0.02	0.6
2N889	2N4216	2N4212	0.35	200	150	0.02	0.6
2N890			0.35	300	150	0.02	0.6
2N891			0.35	400	150	0.02	0.6
2N892*			0.250	15	125	0.05	0.70
2N893*			0.250	15	125	0.05	0.70
2N894*			0.250	30/15	125	0.05	0.70
2N895*			0.250	30/15	125	0.05	0.70
2N896*			0.250	60/15	125	0.05	0.70
2N897*			0.250	60/15	125	0.05	0.70
2N898*			0.250	100/15	125	0.05	0.70
2N899*			0.250	100/15	125	0.05	0.70
2N900*			0.250	200/15	125	0.05	0.70
2N901*			0.250	200/15	125	0.05	0.70
2N948	2N4212	2N4212	0.26	30	150	0.02	1.0
2N949	2N4213	2N4212	0.26	60	150	0.02	1.0
2N950	2N4214	2N4212	0.26	100	150	0.02	1.0
2N951	2N4215	2N4212	0.26	200	150	0.02	1.0
2N1595	2N1595	2N1595	1.6	50	125	10	3.0
2N1595A	2N1595	2N1595	1.6	50	150	2.0	2.0
2N1596		2N1595	1.6	100	125	10	3.0
2N1596A	2N1596	2N1595	1.6	100	150	2.0	2.0
2N1597	2N1597	2N1595	1.6	200	125	10	3.0
2N1597A	2N1597	2N1595	1.6	200	150	2.0	2.0
2N1598	2N1598	2N1595	1.6	300	125	10	3.0
2N1598A	2N1598	2N1595	1.6	300	150	2.0	2.0
2N1599	2N1599	2N1595	1.6	400	125	10	3.0
2N1599A	2N1599	2N1595	1.6	400	150	2.0	2.0
2N1600	2N4168	2N4151	4.0	50	125	10	3.0
2N1600A	2N4168	2N4151	4.0	50	125	4.5	3.0
2N1601	2N4169	2N4151	4.0	100	125	10	3.0



TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N1602	2N4170	2N4151	4.0	200	125	10	3.0
2N1603	2N4171	2N4151	4.0	300	125	10	3.0
2N1604	2N4172	2N4151	4.0	400	125	10	3.0
2N1686*			0.5	30	125	1.0	1.0
2N1687*			0.5	60	125	1.0	1.0
2N1688*			0.5	100	125	1.0	1.0
2N1689*			0.5	200	125	1.0	1.0
2N1765			0.5	400	85	10	1.5
2N1770	2N4167	2N4151	4.7	25	125	15	2.0
2N1770A			4.7	25	150	15	2.0
2N1771	2N4168	2N4151	4.7	50	125	15	2.0
2N1771A			4.7	50	150	15	2.0
2N1772	2N4169	2N4151	4.7	100	125	15	2.0
2N1772A			4.7	100	150	15	2.0
2N1773	2N4170	2N4151	4.7	150	125	15	2.0
2N1773A			4.7	150	150	15	2.0
2N1774	2N4170	2N4151	4.7	200	125	15	2.0
2N1774A			4.7	200	150	15	2.0
2N1775	2N4171	2N4151	4.7	250	125	15	2.0
2N1775A			4.7	250	150	15	2.0
2N1776	2N4171	2N4151	4.7	300	125	15	2.0
2N1776A			4.7	300	150	15	2.0
2N1776B			4.7	300	150	15	2.0
2N1777	2N4172	2N4151	4.7	400	125	15	2.0
2N1777A			7.0	400	150	15	2.0
2N1778	2N4173	2N4151	7.4	500	125	15	2.0
2N1778A			7.0	500	150	15	2.0
2N1792			110	60	125	75	3.0
2N1793			110	120	125	75	3.0
2N1794			110	180	125	75	3.0
2N1795			110	240	125	75	3.0
2N1796			110	300	125	75	3.0
2N1797			110	360	125	75	3.0
2N1798			110	480	125	75	3.0
2N1799			110	600	125	75	3.0
2N1800			110	720	125	75	3.0
2N1801			110	840	125	75	3.0
2N1802			110	960	125	75	3.0
2N1803			110	1080	125	90	3.0
2N1804			110	1200	125	90	3.0
2N1805			110	500	125	75	3.0
2N1806			110	600	125	75	3.0
2N1807			110	700	125	75	3.0
2N1842		2N1842	16	25	100	80	2.0
2N1842A	2N1842A	2N1842A	16	25	125	80	2.0
2N1842B		2N1842A	20	25	125	75	3.0
2N1843		2N1842	16	50	100	80	2.0
2N1843A		2N1842A	16	50	125	80	2.0
2N1843B	2N1843A	2N1842A	20	50	125	75	3.0
2N1844		2N1842	16	100	100	80	2.0
2N1844A	2N1844A	2N1842A	16	100	125	80	2.0
2N1844B		2N1842A	20	100	125	75	3.0
2N1845		2N1842	16	150	100	80	2.0
2N1845A	2N1845A	2N1842A	16	150	125	80	2.0
2N1845B		2N1842A	20	150	125	75	3.0
2N1846		2N1842	16	200	100	80	2.0
2N1846A	2N1846A	2N1842A	16	200	125	80	2.0
2N1846B		2N1842A	20	200	125	75	3.0
2N1847		2N1842	16	250	100	80	2.0
2N1847A		2N1842A	16	250	125	80	2.0
2N1847B	2N1847A	2N1842A	20	250	125	75	3.0
2N1848		2N1842	16	300	100	80	2.0
2N1848A	2N1848A	2N1842A	16	300	125	80	2.0
2N1848B		2N1842A	20	300	125	75	3.0
2N1849		2N1842	16	400	100	80	2.0
2N1849A	2N1849A	2N1842A	16	400	125	80	2.0
2N1849B		2N1842A	20	400	125	75	3.0
2N1850		2N1842	16	500	100	80	2.0
2N1850A		2N1842A	16	500	125	80	2.0



# THYRISTOR INDEX (continued)

2N1850B-2N2261

TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N1850B	2N1850A	2N1842A	20	500	125	75	3.0
2N1869	2N4212	2N4212	1.25	15	150	0.2	0.8
2N1869A			1.25	15	150	0.2	0.8
2N1870	2N4213	2N4212	1.25	30	150	0.2	0.8
2N1870A			1.25	30	150	0.2	0.8
2N1871	2N4214	2N4212	1.25	60	150	0.2	0.8
2N1871A			1.25	60	150	0.2	0.8
2N1872	2N4214	2N4212	1.25	100	150	0.2	0.8
2N1872A			1.25	100	150	0.2	0.8
2N1873	2N4215	2N4212	1.25	150	150	0.2	0.8
2N1873A			1.25	150		0.2	0.8
2N1874	2N4216	2N4212	1.25	200	150	0.2	0.8
2N1874A			1.25	200	150	0.2	0.8
2N1875	2N4212	2N4212	1.25	15	150	0.020	0.6
2N1875A			1.25	15	150	0.020	0.6
2N1876	2N4213	2N4212	1.25	30	150	0.020	0.6
2N1876A			1.25	30	150	0.020	0.6
2N1877	2N4214	2N4212	1.25	60	150	0.020	0.6
2N1877A			1.25	60	150	0.020	0.6
2N1878	2N4214	2N4212	1.25	100	150	0.020	0.6
2N1878A			1.25	100	150	0.020	0.6
2N1879	2N4215	2N4212	1.25	150	150	0.020	0.6
2N1879A			1.25	150	150	0.020	0.6
2N1880	2N4216	2N4212	1.25	200	150	0.020	0.6
2N1880A			1.25	200	150	0.020	0.6
2N1881	2N4212	2N4212	1.0	30	150	2.0	2.0
2N1882	2N4213	2N4212	1.0	60	150	2.0	2.0
2N1883	2N4214	2N4212	1.0	100	150	2.0	2.0
2N1884	2N4215	2N4212	1.0	150	150	2.0	2.0
2N1885	2N4216	2N4212	1.0	200	150	2.0	2.0
2N1909			70	25	125	75	3.0
2N1910			70	50	125	75	3.0
2N1911			70	100	125	75	3.0
2N1912			70	150	125	75	3.0
2N1913			70	200	125	75	3.0
2N1914			70	250	125	75	3.0
2N1914A			70	250	125	75	3.0
2N1914B			70	250	125	75	3.0
2N1915			70	300	125	75	3.0
2N1916			70	400	125	75	3.0
2N1929	2N4191	2N4151	0.75	25	125	15	2.0
2N1930	2N4192	2N4151	0.75	50	125	15	2.0
2N1931	2N4193	2N4151	0.75	100	125	15	2.0
2N1932	2N4194	2N4151	0.75	150	125	15	2.0
2N1933	2N4194	2N4151	0.75	200	125	15	2.0
2N1934	2N4195	2N4151	0.75	250	125	15	2.0
2N1935	2N4195	2N4151	0.75	300	125	15	2.0
2N2009	2N4212	2N4212	1.3	25	150	0.2	1.0
2N2010	2N4213	2N4212	1.3	50	150	0.2	1.0
2N2011	2N4214	2N4212	1.3	100	150	0.2	1.0
2N2012	2N4216	2N4212	1.3	200	150	0.2	1.0
2N2013			1.3	300	150	0.2	1.0
2N2014			1.3	400	150	0.2	1.0
2N2023	2N2023		70	25	150	75	3.0
2N2024	2N2024		70	50	150	75	3.0
2N2025	2N2025		70	100	150	75	3.0
2N2026	2N2026		70	150	150	75	3.0
2N2027	2N2027		70	200	150	75	3.0
2N2028	2N2028		70	250	150	75	3.0
2N2029	2N2029		70	300	150	75	3.0
2N2030			70	400	150	75	3.0
2N2031			110	50	125	75	3.0
2N2044			150	200	125	80	3.0
2N2045			150	300	125	80	3.0
2N2046			150	400	125	80	3.0
2N2047			150	500	125	80	3.0
2N2074	2N4213	2N4212	1.0	50	150	0.2	0.65
2N2260*			200	30	100	0.25	
2N2261*			200	30	100	0.5	



TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N2262*			200	30	100	5.0	
2N2322		2N2322	1.6	25	125	0.2	0.8
2N2322A			1.6	25	125	0.02	0.6
2N2323		2N2322	1.6	50	125	0.2	0.8
2N2323A			1.6	50	125	0.02	0.6
2N2324		2N2322	1.6	100	125	0.2	0.8
2N2324A			1.6	100	125	0.02	0.6
2N2325		2N2322	1.6	150	125	0.2	0.8
2N2325A			1.6	150	125	0.02	0.6
2N2326		2N2322	1.6	200	125	0.2	0.8
2N2326A			1.6	200	125	0.02	0.6
2N2327			1.6	250	125	0.2	0.8
2N2327A			1.6	250	125	0.02	0.6
2N2328			1.6	300	125	0.2	0.8
2N2328A			1.6	300	125	0.02	0.6
2N2329			1.6	400	125	0.2	0.8
2N2329A			1.6	400	125	0.02	0.6
2N2344	MCR1906-1	MCR1906-1	1.6	25	100	0.02	0.8
2N2345	MCR1906-2	MCR1906-1	1.6	50	100	0.02	0.8
2N2346	MCR1906-3	MCR1906-1	1.6	100	100	0.02	0.8
2N2347	MCR1906-4	MCR1906-1	1.6	150	100	0.02	0.8
2N2348	MCR1906-4	MCR1906-1	1.6	200	100	0.02	0.8
2N2503			225	50	125	100	2.5
2N2504			225	100	125	100	2.5
2N2505			225	200	125	100	2.5
2N2506			225	300	125	100	2.5
2N2507			225	400	125	100	2.5
2N2508			225	500	125	100	2.5
2N2542			230	50	125	125	3.0
2N2543			230	100	125	125	3.0
2N2544			230	200	125	125	3.0
2N2545			230	300	125	125	3.0
2N2546			230	400	125	125	3.0
2N2547			230	500	125	125	3.0
2N2548			230	600	125	125	3.0
2N2549			150	800	125	125	3.0
2N2550			150	1000	125	125	3.0
2N2573		2N2573	25	25	125	40	3.5
2N2574		2N2573	25	50	125	40	3.5
2N2575		2N2573	25	100	125	40	3.5
2N2576		2N2573	25	200	125	40	3.5
2N2577		2N2573	25	300	125	40	3.5
2N2578		2N2573	25	400	125	40	3.5
2N2579		2N2573	25	500	125	40	3.5
2N2619	2N4174	2N4151	7.4	600	125	45	2.0
2N2653	2N4172	2N4151	3.0	400	105	35	3.0
2N2679			0.35	30	150	0.02	0.7
2N2679A			0.35	30	150	0.02	0.7
2N2680	MCR103	MCR201	0.35	60	150	0.02	0.7
2N2680A			0.35	60	150	0.02	0.7
2N2681	MCR204	MCR201	0.35	100	150	0.02	0.7
2N2681A			0.35	100	150	0.02	0.70
2N2682	MCR206	MCR201	0.35	200	150	0.02	0.7
2N2682A			0.35	200	150	0.02	0.70
2N2683	MCR202	MCR201	0.28	30	125	0.02	0.8
2N2683A			0.28	30	125	0.02	0.80
2N2684	MCR203	MCR201	0.28	60	125	0.02	0.8
2N2684A			0.28	60	125	0.02	0.80
2N2685	MCR204	MCR201	0.28	100	125	0.02	0.8
2N2685A			0.28	100	125	0.02	0.80
2N2686	MCR206	MCR201	0.28	200	125	0.02	0.8
2N2686A			0.28	200	125	0.02	0.80
2N2687	MCR202	MCR201	0.28	30	125	0.2	1.0
2N2688	MCR203	MCR201	0.28	60	125	0.2	1.0
2N2689	MCR204	MCR201	0.28	100	125	0.2	1.0
2N2690	MCR206	MCR201	0.28	200	125	0.2	1.0
2N2888	MCR1907-4	MCR1907-1	25	200	125	40	1.5



# THYRISTOR INDEX (continued)

2N2889-2N3536

TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N2889	MCR1907-4	MCR1907	25	250	125	40	1.5
2N3001	MCR202	MCR201	0.35	30	150	0.02	0.7
2N3002	MCR203	MCR201	0.35	60	150	0.02	0.7
2N3003	MCR204	MCR201	0.35	100	150	0.02	0.7
2N3004	MCR206	MCR201	0.35	200	150	0.02	0.7
2N3005	MCR202	MCR201	0.35	30	150	0.2	0.8
2N3006	MCR203	MCR201	0.35	60	150	0.2	0.8
2N3007	MCR204	MCR201	0.35	100	150	0.2	0.8
2N3008	MCR206	MCR201	0.35	200	150	0.2	0.8
2N3027	MCR202	MCR201	0.5	30	150	0.2	0.8
2N3028	MCR203	MCR201	0.5	60	150	0.2	0.8
2N3029	MCR204	MCR201	0.5	100	150	0.2	0.8
2N3030	MCR202	MCR201	0.5	30	150	0.02	0.6
2N3031	MCR203	MCR201	0.5	60	150	0.02	0.6
2N3032	MCR204	MCR201	0.5	100	150	0.02	0.6
2N3091	MCR150-60		110	600	125	70	2.0
2N3092	MCR150-70		110	700	125	70	2.0
2N3093	MCR150-80		110	800	125	70	2.0
2N3094	MCR150-90		110	900	125	70	2.0
2N3095	MCR150-100		110	1000	125	70	2.0
2N3096	MCR150-110		110	1100	125	70	2.0
2N3097	MCR150-120		110	1200	125	70	2.0
2N3098	MCR150-130		110	1300	125	70	2.0
2N3099	MCR150-60		110	600	125	70	2.0
2N3100	MCR150-70		110	700	125	70	2.0
2N3101	MCR150-80		110	800	125	70	2.0
2N3102	MCR150-90		110	900	125	70	2.0
2N3103	MCR150-100		110	1000	125	70	2.0
2N3104	MCR150-110		110	1100	125	70	2.0
2N3105	MCR150-120		110	1200	125	70	2.0
2N3106	MCR150-130		110	1300	125	70	2.0
2N3228	2N4154	2N4151	3.2	200	100	15	2.0
2N3254	MCR202	MCR201	0.25	15	150	0.02	0.75
2N3255	MCR202	MCR201	0.25	30	150	0.02	0.75
2N3256	MCR203	MCR201	0.25	60	150	0.02	0.75
2N3257	MCR202	MCR201	0.25	15	150	0.2	0.75
2N3258	MCR202	MCR201	0.25	30	150	0.2	0.75
2N3259	MCR203	MCR201	0.25	60	150	0.2	0.75
2N3269	2N4169	2N4151	8.0	100	150	0.2	0.8
2N3270	2N4170	2N4151	8.0	200	150	0.2	0.8
2N3271	2N4171	2N4151	8.0	300	150	0.2	0.8
2N3272	2N4171	2N4151	8.0	400	150	0.2	0.8
2N3273			2.2	100	150	0.2	0.8
2N3274			2.2	200	150	0.2	0.8
2N3275			2.2	300	150	0.2	0.8
2N3276			2.2	400	150	0.2	0.8
2N3353			400	50	125	200	4.0
2N3354			400	100	125	200	4.0
2N3355			400	200	125	200	4.0
2N3356			400	300	125	200	4.0
2N3357			400	400	125	200	4.0
2N3358			400	500	125	200	4.0
2N3359			400	600	125	200	4.0
2N3360			400	700	125	200	4.0
2N3361			400	800	125	200	4.0
2N3362			400	900	125	200	4.0
2N3363			400	1000	125	200	4.0
2N3364			400	1200	125	200	4.0
2N3422			196	600	125	150	3.0
2N3525	2N4156	2N4151	3.2	400	100	15	2.0
2N3528	2N4186	2N4151	1.3	200	100	15	2.0
2N3529	2N4188	2N4151	1.3	400	100	15	2.0
2N3530			400	50	125	300	4.0
2N3531			400	100	125	300	4.0
2N3532			400	200	125	300	4.0
2N3533			400	300	125	300	4.0
2N3534			400	400	125	300	4.0
2N3535			400	500	125	300	4.0
2N3536			400	600	125	300	4.0



TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N3537			400	700	125	300	4.0
2N3538			400	800	125	300	4.0
2N3539			400	900	125	300	4.0
2N3540			400	1000	125	300	4.0
2N3541			400	1200	125	300	4.0
2N3555			1.6	30	150	0.020	0.7
2N3556			1.6	60	150	0.020	0.7
2N3557			1.6	100	150	0.020	0.7
2N3558			1.6	200	150	0.020	0.7
2N3559			1.6	30	150	0.20	0.8
2N3560			1.6	60	150	0.20	0.8
2N3561			1.6	100	150	0.20	0.8
2N3562			1.6	200	150	0.20	0.8
2N3649			16	50	120	180	3.0
2N3650			16	100	120	180	3.0
2N3651			16	200	120	180	3.0
2N3652			16	300	120	180	3.0
2N3653			16	400	120	180	3.0
2N3654			16	50	120	180	3.0
2N3655			16	100	120	180	3.0
2N3656			16	200	120	180	3.0
2N3657			16	300	120	180	3.0
2N3658			16	400	120	180	3.0
2N3668	MCR649P-3	MCR649-1	13	100	100	40	2.0
2N3669	MCR649P-4	MCR649-1	13	200	100	40	2.0
2N3670	MCR649P-6	MCR649-1	13	400	100	40	2.0
2N3753			7.5	50	120	100	3.0
2N3754			7.5	100	120	100	3.0
2N3755			7.5	200	120	100	3.0
2N3756			7.5	300	120	100	3.0
2N3757			7.5	400	120	100	3.0
2N3758			7.5	500	120	100	3.0
2N3759			7.5	600	120	100	3.0
2N3760			7.5	700	120	100	3.0
2N3761			7.5	800	120	100	3.0
2N3870		2N3870	22	100	100	40	2.0
2N3871		2N3870	22	200	100	40	2.0
2N3872		2N3870	22	400	100	40	2.0
2N3873		2N3870	22	600	100	40	2.0
2N3884			175	50	125	300	4.0
2N3885			175	100	125	300	4.0
2N3886			175	200	125	300	4.0
2N3887			175	300	125	300	4.0
2N3888			175	400	125	300	4.0
2N3889			175	500	125	300	4.0
2N3890			175	600	125	300	4.0
2N3891			175	700	125	300	4.0
2N3892			175	800	125	300	4.0
2N3893			175	900	125	300	4.0
2N3894			175	1000	125	300	4.0
2N3895			175	1200	125	300	4.0
2N3896		2N3870	22	100	100	40	2.0
2N3897		2N3870	22	200	100	40	2.0
2N3898		2N3870	22	400	100	40	2.0
2N3899		2N3870	22	600	100	40	2.0
2N3936			7.0	100	125	60	3.2
2N3937			7.0	200	125	60	3.2
2N3938			7.0	300	125	60	3.2
2N3939			7.0	400	125	60	3.2
2N3940			7.0	500	125	60	3.2
2N3986			70	500	125	150	3.0
2N3987			70	600	125	150	3.0
2N3988			70	700	125	150	3.0
2N3989			70	800	125	150	3.0
2N3990			70	900	125	150	3.0
2N3991			70	1000	125	150	3.0
2N3992			70	1100	125	150	3.0
2N4096	2N4213	2N4212	0.2	50	125	0.2	0.8
2N4097	2N4214	2N4212	0.2	100	125	0.2	0.8



# THYRISTOR INDEX (continued)

2N4098-2N4213

TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N4098	2N4216	2N4212	0.2	50	125	0.2	0.8
2N4101	2N4166	2N4151	3.2	600	100	15	2.0
2N4102	2N4166	2N4151	1.3	600	100	15	2.0
2N4103	MCR649P-8	MCR649-1	8.0	600	100	40	2.0
2N4108	2N4213	2N4212		50	125		
2N4109	2N4214	2N4212		100	125		
2N4110	2N4216	2N4212		200	125		
2N4144	MCR1906-1	MCR1906-1	0.250	15	150	1.0	0.8
2N4145	MCR1906-1	MCR1906-1	0.250	30	150	1.0	0.8
2N4146	MCR1906-2	MCR1906-1	0.250	60	150	1.0	0.8
2N4147	MCR1906-3	MCR1906-1	0.250	100	150	1.0	0.8
2N4148	MCR1906-4	MCR1906-1	0.250	150	150	1.0	0.8
2N4149	MCR1906-4	MCR1906-1	0.250	200	150	1.0	0.8
2N4151		2N4151	8.0	25	100	20	1.5
2N4152		2N4151	8.0	50	100	20	1.5
2N4153		2N4151	8.0	100	100	20	1.5
2N4154		2N4151	8.0	200	100	20	1.5
2N4155		2N4151	8.0	300	100	20	1.5
2N4156		2N4151	8.0	400	100	20	1.5
2N4157		2N4151	8.0	500	100	20	1.5
2N4158		2N4151	8.0	600	100	20	1.5
2N4159		2N4151	8.0	25	100	20	1.5
2N4160		2N4151	8.0	50	100	20	1.5
2N4161		2N4151	8.0	100	100	20	1.5
2N4162		2N4151	8.0	200	100	20	1.5
2N4163		2N4151	8.0	300	100	20	1.5
2N4164		2N4151	8.0	400	100	20	1.5
2N4165		2N4151	8.0	500	100	20	1.5
2N4166		2N4151	8.0	600	100	20	1.5
2N4167		2N4151	8.0	25	100	20	1.5
2N4168		2N4151	8.0	50	100	20	1.5
2N4169		2N4151	8.0	100	100	20	1.5
2N4170		2N4151	8.0	200	100	20	1.5
2N4171		2N4151	8.0	300	100	20	1.5
2N4172		2N4151	8.0	400	100	20	1.5
2N4173		2N4151	8.0	500	100	20	1.5
2N4174		2N4151	8.0	600	100	20	1.5
2N4175		2N4151	8.0	25	100	20	1.5
2N4176		2N4151	8.0	50	100	20	1.5
2N4177		2N4151	8.0	100	100	20	1.5
2N4178		2N4151	8.0	200	100	20	1.5
2N4179		2N4151	8.0	300	100	20	1.5
2N4180		2N4151	8.0	400	100	20	1.5
2N4181		2N4151	8.0	500	100	20	1.5
2N4182		2N4151	8.0	600	100	20	1.5
2N4183		2N4151	8.0	25	100	20	1.5
2N4184		2N4151	8.0	50	100	20	1.5
2N4185		2N4151	8.0	100	100	20	1.5
2N4186		2N4151	8.0	200	100	20	1.5
2N4187		2N4151	8.0	300	100	20	1.5
2N4188		2N4151	8.0	400	100	20	1.5
2N4189		2N4151	8.0	500	100	20	1.5
2N4190		2N4151	8.0	600	100	20	1.5
2N4191		2N4151	8.0	25	100	20	1.5
2N4192		2N4151	8.0	50	100	20	1.5
2N4193		2N4151	8.0	100	100	20	1.5
2N4194		2N4151	8.0	200	100	20	1.5
2N4195		2N4151	8.0	300	100	20	1.5
2N4196		2N4151	8.0	400	100	20	1.5
2N4197		2N4151	8.0	500	100	20	1.5
2N4198		2N4151	8.0	600	100	20	1.5
2N4199		2N4199	100*	300	105	50	1.5
2N4200		2N4199	100*	400	105	50	1.5
2N4201		2N4199	100*	500	105	50	1.5
2N4202		2N4199	100*	600	105	50	1.5
2N4203		2N4199	100*	700	105	50	1.5
2N4204		2N4199	100*	800	105	50	1.5
2N4212		2N4212	1.6	25	125	0.1	1.5
2N4213		2N4212	1.6	50	125	0.1	1.5



TYPE	REPLACEMENT	REF.	$I_T(RMS)$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N4214	MCR3918-3	2N4212	1.6	100	125	0.1	1.5
2N4215		2N4212	1.6	150	125	0.1	1.5
2N4216		2N4212	1.6	200	125	0.1	1.5
2N4217			1.0	250	125		
2N4218			1.0	300	125		
2N4219			1.0	400	125		
2N4316		MCR3918	9.2	100	150	15	1.2
2N4317		MCR3918-4	9.2	200	150	15	1.2
2N4318		MCR3918	9.2	300	150	15	1.2
2N4319		MCR3918-5	9.2	400	150	15	1.2
2N4361		MCR3918-6	70	100	250	250	5.0
2N4362		2N4361	70	200	250	250	5.0
2N4363		2N4361	70	400	250	250	5.0
2N4364		2N4361	70	600		250	5.0
2N4365		2N4361	70	800		250	5.0
2N4366		2N4361	70	1000		250	5.0
2N4367		2N4361	70	1200		250	5.0
2N4368		2N4361	70	1400		250	5.0
2N4369			70	1600		250	5.0
2N4370			70	1800		250	5.0
2N4371		2N4361	70	100		250	5.0
2N4372		2N4361	70	200		250	5.0
2N4373		2N4361	70	400		250	5.0
2N4374		2N4361	70	600		250	5.0
2N4375		2N4361	70	800		250	5.0
2N4376		2N4361	70	1000		250	5.0
2N4377		2N4361	70	1200		250	5.0
2N4378		2N4361	70	1400		250	5.0
2N4379			70	1600		250	5.0
2N4380			70	1800		250	5.0
2N4441		2N4441	8.0	50	100	30	1.5
2N4442		2N4441	8.0	200	100	30	1.5
2N4443		2N4441	8.0	400	100	30	1.5
2N4444		2N4441	8.0	600	100	30	1.5
2N4983			0.175	30	125	0.50	6.0
2N4984			0.200	30	150	0.15	7.5
2N4985			0.200	30	150	0.30	7.5
2N4986			0.175	30	125	0.20	7.0
2N4987			0.175	30	125	0.50	6.0
2N4988			0.200	30	150	0.15	7.5
2N4989			0.200	30	150	0.30	7.5
2N4990			0.175	30	125	0.20	7.0
2N4991		MBS4991	0.175		125	0.50	6.0
2N4992		MBS4992	0.200		150	0.12	7.5
2N4993		MBS4991	0.200		150	0.50	6.0
2N5060		2N5060	0.8	30	125	0.2	0.8
2N5061		2N5060	0.8	60	125	0.2	0.8
2N5062		2N5060	0.8	100	125	0.2	0.8
2N5063		2N5060	0.8	150	125	0.2	0.8
2N5064		2N5060	0.510	200	125	350	1.2
2N5164		2N5164	13	50	100	75	0.2
2N5165		2N5164	13	200	100	75	0.2
2N5166		2N5164	13	400	100	75	0.2
2N5167		2N5164	13	600	100	75	0.2
2N5168		2N5164	13	50	100	75	0.2
2N5169		2N5164	13	200	100	75	0.2
2N5170		2N5164	13	400	100	75	0.2
2N5171		2N5164	13	600	100	75	0.2
2N5204			200	600		80	3.0
2N5205			200	600		80	3.0
2N5206			200	600		80	3.0
2N5207			200	600		80	3.0
2N5257			200	400	105	800	3.0
2N5258			200	600	105	800	3.0
2N5259			200	800	105	800	3.0
2N5260			200	1000	105	800	3.0
2N5261			200	1200	105	800	3.0
2N5273			25	200	125	150	3.5
2N5274			25	400	125	150	3.5
2N5275			25	600	125	150	3.5



TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N5567			10	200	100	100	4.0
2N5568			10	400	100	100	4.0
2N5569			10	200	100	100	4.0
2N5570			10	400	100	100	4.0
2N5571			15	200	100	150	4.0
2N5572			15	400	100	150	4.0
2N5573			15	200	100	150	4.0
2N5574			15	400	100	150	4.0
2N5754			2.5	100	100	60	3.0
2N5755			2.5	200	100	60	3.0
2N5756			2.5	400	100	60	3.0
2N5757			2.5	600	100	60	3.0
2N5806			25	200	115(1)	±120	±4.0
2N5807			25	400	115(1)	±120	±4.0
2N5808			25	500	115(1)	±120	±4.0
2N5809			25	600	115(1)	±120	±4.0
2N6068		2N6068	4.0	25	110	60	2.5
2N6068A		2N6068A	4.0	25	110	20	2.5
2N6068B		2N6068A	4.0	25	110	15	2.5
2N6069		2N6068	4.0	50	110	60	2.5
2N6069A		2N6068A	4.0	50	110	20	2.5
2N6069B		2N6068A	4.0	50	110	15	2.5
2N6070		2N6068	4.0	100	110	60	2.5
2N6070A		2N6068A	4.0	100	110	20	2.5
2N6070B		2N6068A	4.0	100	110	15	2.5
2N6071		2N6068	4.0	200	110	60	2.5
2N6071A		2N6068A	4.0	200	110	20	2.5
2N6071B		2N6068A	4.0	200	110	15	2.5
2N6072		2N6068	4.0	300	110	60	2.5
2N6072A		2N6068A	4.0	300	110	20	2.5
2N6072B		2N6068A	4.0	300	110	15	2.5
2N6073		2N6068	4.0	400	110	60	2.5
2N6073A		2N6068A	4.0	400	110	20	2.5
2N6073B		2N6068A	4.0	400	110	15	2.5
2N6074		2N6068	4.0	500	110	60	2.5
2N6074A		2N6068A	4.0	500	110	20	2.5
2N6074B		2N6068A	4.0	500	110	15	2.5
2N6075		2N6068	4.0	600	110	60	2.5
2N6075A		2N6068A	4.0	600	110	20	2.5
2N6075B		2N6068A	4.0	600	110	15	2.5
2N6139		2N6139	10	200	100	125	2.5
2N6140		2N6139	10	400	100	125	2.5
2N6141		2N6139	10	600	100	125	2.5
2N6142		2N6139	10	200	100	125	2.5
2N6143		2N6139	10	400	100	125	2.5
2N6144		2N6139	10	600	100	125	2.5
2N6145			15	200	150	150	4.0
2N6146			15	400	150	150	4.0
2N6147			15	600	150	150	4.0
2N6148		2N6148	10	200	100	125	2.5
2N6149		2N6148	10	400	100	125	2.5
2N6150		2N6148	10	600	100	125	2.5
2N6151		2N6151	10	200	100	100	2.5
2N6152		2N6151	10	400	100	100	2.5
2N6153		2N6151	10	600	100	100	2.5
2N6154		2N6151	10	200	100	100	2.5
2N6155		2N6151	10	400	100	100	2.5
2N6156		2N6151	10	600	100	100	2.5
2N6157		2N6157	30	200	125	200	3.4
2N6158		2N6157	30	400	125	200	3.4
2N6159		2N6157	30	600	125	200	3.4
2N6160		2N6157	30	200	125	200	3.4
2N6161		2N6157	30	400	125	200	3.4
2N6162		2N6157	30	600	125	200	3.4
2N6163		2N6157	30	200	125	200	3.4
2N6164		2N6157	30	400	125	200	3.4
2N6165		2N6157	30	600	125	200	3.4
2N6167			240	100	100	75	2.5
2N6168			240	200	100	75	2.5

2



TYPE	REPLACEMENT	REF.	$I_{T(RMS)}$ Amp	$V_{DRM}/V_{RRM}$ volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ volts
2N6169			240	400	100	75	2.5
2N6170			240	600	100	75	2.5
2N6171		2N3870	350	100	100	80	3.0
2N6172		2N3870	350	200	100	80	3.0
2N6173		2N3870	350	400	100	80	3.0
2N6174		2N3870	350	600	100	80	3.0
2N6236		2N6236		30	110	500*	1.0
2N6237		2N6236		50	110	500*	1.0
2N6238		2N6236		100	110	500*	1.0
2N6239		2N6236		200	110	500*	1.0
2N6240		2N6236		400	110	500*	1.0
2N6241		2N6236		600	110	500*	1.0
2N6332			20	30	150	0.5	1.0
2N6333			20	50	150	0.5	1.0
2N6334			20	100	150	0.5	1.0
2N6335			20	200	150	0.5	1.0
2N6336			20	300	150	0.5	1.0
2N6337			20	400	150	0.5	1.0
2N6342			8.0	200	100	125	3.0
2N6342A			12	200	110	125	3.0
2N6343			8.0	400	100	125	3.0
2N6343A			12	400	110	125	3.0
2N6344			8.0	600	100	125	3.0
2N6344A			12	600	110	125	3.0
2N6345			8.0	800	100	125	3.0
2N6345A			12	800	110	125	3.0
2N6346			8.0	200	100	125	3.0
2N6346A			12	200	110	125	3.0
2N6347			8.0	400	100	125	3.0
2N6347A			12	400	110	125	3.0
2N6348			8.0	600	100	125	3.0
2N6348A			12	600	110	125	3.0
2N6349			8.0	800	100	125	3.0
2N6349A			12	800	110	125	3.0
2N6394		2N6394	12	50	125	60	2.5
2N6395		2N6394	12	100	125	60	2.5
2N6396		2N6394	12	200	125	60	2.5
2N6397		2N6394	12	400	125	60	2.5
2N6398		2N6394	12	600	125	60	2.5
2N6399		2N6394	12	800	125	60	2.5
2N6400		2N6400	16	50	125	60	2.5
2N6401		2N6400	16	100	125	60	2.5
2N6402		2N6400	16	200	125	60	2.5
2N6403		2N6400	16	400	125	60	2.5
2N6404		2N6400	16	600	125	60	2.5
2N6405		2N6400	16	800	125	60	2.5
3N58			0.064	40	150	0.001	0.65
3N59			0.064	40	150	0.001	0.65
3N60			0.064	40	150	0.001	0.65
3N80			0.127	40	150	0.001	0.65
3N81			0.127	65	150	0.001	0.65
3N82			0.127	100	150	0.001	0.65
3N83			0.032	70	125	0.15	0.80
3N84			0.111	40	125	0.01	0.65
3N85			0.111	100	125	0.01	0.65
3N86			0.127	65	150	0.001	0.65



# FIELD-EFFECT TRANSISTORS

## INDEX AND SHORT-FORM SPECIFICATIONS

This table contains a numerical listing and short-form specifications for field-effect transistors with EIA-registered 2N and 3N numbers.

### KEY

TYPE	POLARITY CONST.	NEAREST EQUIV.	REF.	$I_{DSS}$		$I_{GSS}$ $I_{DGO}^*$ nA	Breakdown Voltage		$y_{fs}$		$C_{iss}$ pF	NF dB $\frac{\mu V}{\sqrt{Hz}}$ @ $f$ Units	NOTE D = Dual MP = Matched Pair
				Min mA	Max mA (*nA)		$V_{(BR)}$ Volts	Sub- script	Min $\mu mhos$	Max $\mu mhos$			
Numerical Listing of Registered Type Numbers				Minimum and Maximum Drain Current with gate connected to source								Noise Figure in dB or *, $\mu V / \sqrt{Hz}$ at a specified frequency  frequency units: H = Hz K = kHz M = MHz	
N = n-channel P = p-channel				Maximum Gate Current (leakage) with drain connected to source *Maximum leakage from drain to gate with source open									
J = Junction FET M = MOS FET									Minimum and Maximum Forward Transadmittance			Maximum Input Capacitance	
Type number of nearest electrical equivalent fully characterized in this book							Minimum Breakdown Voltage (Subscript defines conditions)						
Reference device number indicates specific Data Sheet on which device is characterized							GS = Gate to source, drain connection not specified						
							GSS = Gate to source, drain connected to source						
							GD = Gate to drain, source connection not specified						
							GDS = Gate to drain, source connected to drain						
							DGO = Drain to gate, source open						
							DGS = Drain to gate, source connected to drain						
							DS = Drain to source, gate connection not specified						
							DSX = Drain to source, gate biased to cutoff or beyond						



# FIELD-EFFECT TRANSISTORS INDEX

2N2386-2N3684

TYPE	POLARITY	CONST.	NEAREST EQUIVALENT	REF.	I <sub>DSS</sub>		I <sub>GSS</sub> I <sub>DGO</sub> *	Breakdown Voltage		Y <sub>f</sub>		C <sub>ISS</sub> pF	NF @ f		NOTE
					Min mA	Max mA		V <sub>(BR)</sub> Volts	Sub- script	Min μmhos	Max μmhos		dB μV* √Hz	Units	
					* nA					* mmhos					
2N2386	P	J	2N5266-9	2N5265	1.0	15	10	20	GS	1000		50			
2N2386A	P	J	2N5267-70	2N5265	1.0	5.0	10	20	DGO	2200	5000	10			
2N2497	P	J	2N5267	2N5265	1.0	6.0	10	20	GD	1000	2000	32	3.0	1.0 K	
2N2498	P	J	2N5268	2N5265	2.0	1.0	10	20	GD	1500	3000	32	3.0	1.0 K	
2N2499	P	J	2N5269-70	2N5265	5.0	1.5	10	20	GD	2000	4000	32	4.0	1.0 K	
2N2500	P	J	2N5267-8	2N5265	1.0	6.0	10	20	GS	1000	2000	32	1.0	1.0 K	
2N2606	P	J	2N5473-4	2N5471	0.1	0.5	1.0	30	GDS	110		6.0	3.0	1.0 K	
2N2607	P	J	2N5475-6	2N5471	0.3	1.5	3.0	30	GDS	330		10	3.0	1.0 K	
2N2608	P	J	2N5266-8	2N5265	0.9	4.5	10	30	GDS	1000		17	3.0	1.0 K	
2N2609	P	J	2N5268-70	2N5265	2.0	10	30	30	GDS	2500		30	3.0	1.0 K	
2N2620	N	J					100	50	DGO						
2N2794	P	J			1.5	5.0	10	20	DGO						
2N2841	P	J	2N5471-2	2N5471	0.025	0.125	1.0			60		6.0	3.0	1.0 K	
2N2842	P	J	2N5472-3	2N5471	0.065	0.325	3.0			180		10	3.0	1.0 K	
2N2843	P	J	2N5265	2N5265	0.2	1.0	10			540		17	3.0	1.0 K	
2N2844	P	J	2N5265-7	2N5265	1.0	2.2	30			1000		30	3.0	1.0 K	
2N3066	N	J	MFE2095	MFE2093	0.8	4.0	1.0	50	DGO	400	1000	10	3.0	1.0 K	
2N3066A	N	J			0.8	4.0	1.0	50	DGO	400	1000	10	0.25	1.0 K	
2N3067	N	J	MFE2093-4	MFE2093	0.2	1.0	1.0	50	DGO	400		18	3.0	1.0 K	
2N3067A	N	J			0.2	1.0	1.0	50	DGO	300	1000	10	0.25	1.0 K	
2N3068	N	J	MFE2093	MFE2093	0.05	0.25	1.0	50	DGO	200		18	3.0	1.0 K	
2N3068A	N	J	MFE2093	MFE2093	0.05	0.25	1.0	50	DGO	200	1000	10	0.25	1.0 K	
2N3069	N	J	2N4220A-2A	2N4220	2.0	10	1.0	50	DGO	1000		15	3.0	1.0 K	
2N3069A	N	J			2.0	10	1.0	50	DGO	1000	2500	15	0.25	1.0 K	
2N3070	N	J	2N4220A	2N4220	0.5	2.5	1.0	50	DGO	750		15	3.0	1.0 K	
2N3070A	N	J			0.5	2.5	1.0	50	DGO	750	2500	15	0.25	1.0 K	
2N3071	N	J	2N4220A	2N4220	0.1	0.6	1.0	50	DGO	500	2500	15	3.0	1.0 K	
2N3084	N	J	MFE2095	MFE2093	0.8	3.0	0.1	15	DGO	400	2000	14			
2N3085	N	J	MFE2095	MFE2093	0.8	3.0	0.1	15	DGO	400	2000	14			
2N3086	N	J	MFE2095	MFE2093	0.8	3.0	1.0	30	DGS	400	2000	14			
2N3087	N	J	MFE2095	MFE2093	0.8	3.0	1.0	30	DGS	400	2000	14			
2N3088	N	J	MFE2094-5	MFE2093	0.5	2.0	1.0	10	DGS	300	2000	14	3.0		
2N3088A	N	J	MFE2094-5	MFE2093	0.5	2.0	1.0	10	DGS	300	2000	14	0.5	10 H	
2N3089	N	J	MFE2094-5	MFE2093	0.5	2.0	1.0	10	DGS	300	2000	14	3.0		
2N3089A	N	J	MFE2094-5	MFE2093	0.5	2.0	1.0	10	DGS	300	2000	14	0.5	10 H	
2N3112	P	J	2N5471-3	2N5471	0.035	0.175	0.05	20	GDS	50	115	3.5			
2N3113	P	J	2N5471-3	2N5471	0.035	0.175	0.05	20	GDS	50	115	2.0			
2N3277	P	J	2N5473-4	2N5471	0.15	0.5	0.4	25	DGO	100		3.0			
2N3278	P	J	2N5475	2N5471	0.4	0.9	0.4	25	DGO	150		3.0			
2N3328	P	J	2N5473-5	2N5471	1.0		1.0	20	GSS	100		3.0	3.0		
2N3329	P	J	2N5266-7	2N5265	1.0	3.0	10	20	GSS	1000	2000	20	3.0		
2N3330	P	J	2N5267-8	2N5265	2.0	6.0	10	20	GSS	1500	3000	20	3.0		
2N3331	P	J	2N5269-70	2N5265	5.0	15	10	20	GSS	2000	4000	20	4.0		
2N3332	P	J	2N5267-8	2N5265	1.0	6.0	10	20	GSS	1000	2200	20	1.0		
2N3333	P	J			0.3	1.0	10	20	GSS	600	1800	30			Dual
2N3334	P	J			0.3	1.0	10	20	GSS	600	1800	30			Dual
2N3335	P	J			0.3	1.0	10	20	GSS	600	1800	30			Dual
2N3336	P	J			0.3	1.0	10	20	GSS	600	1800	30			Dual
2N3365	N	J	2N4220A 1A	2N4220	0.8	4.0	5.0	40	DGO	250	1000	15			
2N3366	N	J	MFE2093-4	MFE2093	0.2	1.0	5.0	40	DGO	250	1000	15			
2N3367	N	J	MFE2093	MFE2093	0.005	0.25	5.0	40	DGO	100	1000	15			
2N3368	N	J	2N4221A-2A	2N4220	2.0	12	5.0	40	DGO	1000	4000	20			
2N3369	N	J	2N4220A	2N4220	0.5	2.5	5.0	40	DGO	600	2500	20			
2N3370	N	J	MFE2093	MFE2093	0.1	0.6	5.0	40	DGO	300	2500	20			
2N3376	P	J	2N5265-8	2N5265	0.6	3.0	3.0	30	DGS	800		5.0			
2N3377	P	J	2N5265-8	2N5265	0.6	6.0	3.0	30	DGS	800	2300	4.0			
2N3378	P	J	2N5268	2N5265	3.0	6.0	3.0	30	DGS	1500	2300	5.0			
2N3379	P	J	2N5268	2N5265	3.0	6.0	3.0	30	DGS	1500	2300	4.0			
2N3380	P	J	2N5268-70	2N5265	3.0	20	3.0	30	DGS	1500	3000	4.0			
2N3381	P	J	2N5268-70	2N5265	3.0	20	3.0	30	DGS	1500	3000	4.0			
2N3382	P	J	2N3994	2N3993	3.0	30	15	30	DGS	4500	12500				
2N3383	P	J	2N3994	2N3993	3.0	30	15	30	DGS	4500	12500				
2N3384	P	J	2N3993	2N3993	15	30	15	30	DGS	7500	12500				
2N3385	P	J	2N3993	2N3993	15	30	15	30	DGS	7500	12500				
2N3386	P	J	2N3993	2N3993	13	50	15	30	DGS	7500	12500				
2N3387	P	J	2N3993	2N3993	13	50	15	30	DGS	7500	12500				
2N3436	N	J	2N4222A	2N4220	3.0	15	0.5	50	DGO	2500	10000	18	2.0		
2N3437	N	J	2N4220A	2N4220	0.8	4.0	0.5	50	DGO	1500	6000	18	2.0		
2N3438	N	J	2N4222A	2N4220	0.2	1.0	0.5	50	DGO	800	4500	18	2.0		
2N3452	N	J	MFE2095	MFE2093	0.8	4.0	0.1	50	DGO	200	1200	6.0	2.0		
2N3453	N	J	MFE2094	MFE2093	0.2	1.0	0.1	50	DGO	150	900	6.0	2.0		
2N3454	N	J	MFE2093	MFE2093	0.05	0.25	0.1	50	DGO	100	600	6.0	2.0		
2N3455	N	J	MFE2095	MFE2093	0.8	4.0	0.04	50	DGO	400	1200	5.0	4.0		
2N3456	N	J	MFE2094	MFE2093	0.2	1.0	0.04	50	DGO	300	900	5.0	4.0		
2N3457	N	J	MFE2093	MFE2093	0.05	0.25	0.04	50	DGO	150	600	5.0	4.0		
2N3458	N	J	2N4222A	2N4220	3.0	15	0.25	50	DGO	2500	10000	18	6.0		
2N3459	N	J	2N4220A	2N4220	0.8	4.0	0.25	50	DGO	1500	6000	18	4.0		
2N3460	N	J	2N4220A	2N4220	0.2	1.0	0.25	30	DGO	800	4500	18	4.0		
2N3465	N	J	MFE2095	MFE2093	1.0	5.0	1.0	40	DGO	400	1200	15	5.0		
2N3466	N	J	MFE2095	MFE2093	1.0	5.0	1.0	40	DGO	400	1200	15	5.0		
2N3573	P	J	2N5471-2	2N5471	0.02	0.1	0.6	25	GSS	100	300	6.0	3.0		
2N3574	P	J	2N5472-4	2N5471	0.075	0.375	0.6	25	GSS	200	600	6.0	3.0		
2N3575	P	J	2N5474-5	2N5471	0.2	1.0	0.6	25	GSS	300	900	6.0	3.0		
2N3578	P	J	2N5266-8	2N5265	0.9	4.5	15	20	GSS	1200	3500	65			
2N3608	P	M	2N4352	2N4352	30	0.025									
2N3609	P	M	MFE3020-1	MFE3020	35	0.02									
2N3610	P	M	2N4352	2N4352	10	0.02									
2N3631	N	M	2N3797	2N3796	2.0	10		20	DSX	1400	2800	7.5			
2N3684	N	J	2N4221A	2N4221	2.5	7.5	0.1	50	GS	2000	3000	4.0	0.5		



TYPE	POLARITY	CONST.	NEAREST EQUIVALENT	REF.	I <sub>DSS</sub>		I <sub>DSS @ V<sub>DS0</sub>*</sub>	Breakdown Voltage		Y <sub>fs</sub>		C <sub>ISS</sub>	NF @ f		NOTE
					Min mA	Max mA		V <sub>(BR)</sub> Volts	Sub-script	Min μmhos	Max μmhos		pF	dB μV* √Hz	
					* nA					* mmhos					
2N3684A	N	J	2N4221A		2.5	7.5	0.1	50	GSS			4.0	0.5	100H	
2N3685	N	J	2N4220A	2N4221	1.0	3.0	0.1	50	GS	1500	2500	4.0	0.5		
2N3685A	N	J	2N4220A		1.0	3.0	0.1	50	GSS			4.0	0.5	100H	
2N3686	N	J	2N4220A	2N4221	0.4	1.2	0.1	50	GS	1000	2000	4.0	0.5		
2N3686A	N	J	2N4220A		0.4	1.2	0.1	50	GSS			4.0	0.5	100H	
2N3687	N	J	2N5358	2N5358	0.1	0.5	0.1	50	GS	500	1500	4.0	0.15*	100H	
2N3687A	N	J	2N4220A		0.1	0.5	0.1	50	GSS			4.0	0.5	100H	
2N3695	P	J	2N5267	2N5265	1.25	3.75	0.1	30	GS	1000	1750	5.0	0.2*		
2N3696	P	J	2N5266	2N5265	0.5	1.5	0.1	30	GS	750	1250	5.0	0.2*		
2N3697	P	J	2N5265	2N5265	0.2	0.6	0.1	30	GS	500	1000	5.0	0.2*		
2N3698	P	J	2N5265	2N5265	0.05	0.25	0.1	30	GS	250	750	5.0	0.2*		
2N3796	N	M	2N3796	2N3796	0.5	3.0	0.001	25	DSX	900	1800	6.0	4.0		
2N3797	N	M	2N3797	2N3796	2.0	6.0	0.001	20	DSX	1500	3000	8.0	4.0		
2N3819	N	J	MPF102	MPF102	2.0	20	2.0	25	GSS	2000	6500	8.0			
2N3820	P	J	2N5460-2	2N5460	0.3	15	20	20	GSS	800	5000	32			
2N3821	N	J	2N3821	2N3821	0.5	2.5	0.1	50	GSS	1500	4500	6.0	5.0	10 H	
2N3822	N	J	2N3822	2N3821	2.0	10	0.1	50	GSS	3000	6500	6.0	5.0	10 H	
2N3823	N	J	2N3823	2N3823	4.0	20	0.5	30	DGS	3500	6500	6.0	2.5	100 M	
2N3824	N	J	2N3824	2N3821			0.1	50	GSS			6.0			
2N3882	P	M	MFE3003	MFE3003	0.25		0.1	30	DS	1000	2400	4.0	3.0		
2N3909	P	J	2N5460-2	2N5460	0.3	15	10	20	DGS	1000	5000	32			
2N3909A	P	J	2N5460-2		1.0	15	10	20	GSS	2000		9.0			
2N3921	N	J	MMF1,2	MMF1	1.0	10	0.25	50	GSS	1500	7500	18	2.0	1.0 K	Dual
2N3922	N	J	MMF3,4	MMF1	1.0	10	0.25	50	GSS	1500	7500	18	2.0	1.0 K	Dual
2N3934	N	J	MMF1,2	MMF1	0.25	1.3	0.1	50	GSS	300	900	7.0	2.0	100 H	Dual
2N3935	N	J	MMF5,6	MMF1	0.25	1.3	0.1	50	GSS	300	900	7.0	2.0	100 H	Dual
2N3954	N	J	MMF1,2	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3954A	N	J	MMF1,2	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3955	N	J	MMF1,2	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3955A	N	J	MMF1,2	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3956	N	J	MMF5,6	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3957	N	J	MMF5,6	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3958	N	J	MMF5,6	MMF1	0.5	5.0	0.1	50	GSS	1000		4.0	0.5	100 H	Dual
2N3966	N	J	2N4221	2N4220	2.0		0.1	30	DGS			6.0			
2N3967	N	J	2N4221A-2A	2N4220	2.5	10	0.1	30	DGS	1600	2400	5.0			
2N3967A	N	J	2N4221A-2A	2N4220	2.5	10	0.1	30	GSS	1600	2400	5.0	1.5	100 H	
2N3968	N	J	2N4221A	2N4220	1.0	5.0	0.1	30	DGS	1400	2000	5.0			
2N3968A	N	J	2N4221A	2N4220	1.0	5.0	0.1	30	GSS	1400	2000	5.0	1.5	100 H	
2N3969	N	J	2N4220A	2N4220	0.4	2.0	0.1	30	DGS	950	1450	5.0			
2N3969A	N	J	2N4220A	2N4220	0.4	2.0	0.1	30	GSS	950	1450	5.0	1.5	100 H	
2N3970	N	J	2N4091	2N4091	50	150	0.25*	40	DGS			25			
2N3971	N	J	2N4091-2	2N4091	25	75	0.25*	40	DGS			25			
2N3972	N	J	2N4093	2N4091	5.0	30	0.25*	40	DGS			25			
2N3993	P	J	2N3993	2N3993	10		1.2*	25	GSS	6000	12000	16			
2N3994	P	J	2N3994	2N3993	2.0		1.2*	25	GSS	4000	10000	16			
2N4038	N	M	2N3796	2N3796		0.1	15	15	DSX						
2N4039	N	M	2N3796	2N3796		1.5	15	15	DSX						
2N4065	P	M	2N4352	2N4352		0.005	0.0025	25	GSS			4.5			
2N4066	P	M	2N4066	2N4066			0.0025	25	GSS			7.0			
2N4067	P	M	2N4067	2N4066		1.0*	0.1	30	DSS	2500		7.0			
2N4082	N	J	MMF1,2	MMF1	0.25	1.3	0.1	50		300		7.0			Dual
2N4083	N	J	MMF3,4	MMF1	0.25	1.3	0.1	50		300		7.0			Dual
2N4084	N	J	MMF1,2	MMF1	1.0	10	0.25	50		1500		18			Dual
2N4085	N	J	MMF3,4	MMF1	1.0	10	0.25	50		1500		18			Dual
2N4088	P	J	MPF161	MPF161	5.0	15	0.1	30	GSS	1000	1600	10	1.5	1.0 K	
2N4089	P	J	MPF161	MPF161	2.0	8.0	0.1	30	GSS	800	1300	10	1.5	1.0 K	
2N4090	P	J	MPF161	MPF161	0.4	2.5	0.1	30	GSS	500	900	10	1.5	1.0 K	
2N4091	N	J	2N4091	2N4091	30		0.2*	40	DGO			16			
2N4091A	N	J	2N4091	2N4091	30		0.04	50	GSS			16			
2N4092	N	J	2N4092	2N4091	15		0.2*	40	DGO			16			
2N4092A	N	J	2N4092	2N4091	15		0.04	50	GSS			16			
2N4093	N	J	2N4093	2N4091	8.0		0.2*	40	DGO			16			
2N4093A	N	J	2N4093	2N4091	8.0		0.04	50	GSS			16			
2N4094	N	J	2N4091	2N4091	75			40	GSS			32			
2N4095	N	J	2N4092	2N4091	20			40	GSS			32			
2N4117	N	J	MFE2093	MFE2093	0.03	0.09	0.01	40	GSS	70	210	3.0			
2N4117A	N	J	MFE2093	MFE2093	0.03	0.09	0.001	40	DGO			3.0			
2N4118	N	J	MFE2093	MFE2093	0.08	0.24	0.01	40	DGO	80	250	3.0			
2N4118A	N	J	MFE2093	MFE2093	0.08	0.24	0.001	40	DGO			3.0			
2N4119	N	J	MFE2093	MFE2093	0.2	0.6	0.01	40	GSS	100	330	3.0			
2N4119A	N	J	MFE2093	MFE2093	0.2	0.6	0.001	40	DGO			3.0			
2N4120	P	M	2N4352	2N4352		500*	0.0025	30	DSS	700		0.7			
2N4139	N	J	2N4222A	2N4221	8.0	11	1.0	50	DGO			18			
2N4220	N	J	2N4220	2N4220	0.5	3.0	0.1	30	GSS	1000	4000	6.0			
2N4220A	N	J	2N4220A	2N4220	0.5	3.0	0.1	30	GSS	1000	4000	6.0	2.5	1.0 H	
2N4221	N	J	2N4221	2N4220	2.0	6.0	0.1	30	GSS	2000	5000	6.0			
2N4221A	N	J	2N4221A	2N4220	2.0	6.0	0.1	30	GSS	2000	5000	6.0	2.5	1.0 H	
2N4222	N	J	2N4222	2N4220	5.0	15	0.1	30	GSS	2500	6000	6.0			
2N4222A	N	J	2N4222A	2N4220	5.0	15	0.1	30	GSS	2500	6000	6.0	2.5	1.0 H	
2N4223	N	J	2N4223	2N4220	3.0	18	0.25	30	GSS	3000	7000	6.0	5.0	200 M	
2N4224	N	J	2N4224	2N4223	2.0	20	0.5	30	GSS	2000	7500	6.0			
2N4267	P	M	2N4352	2N4352		0.001	0.005	30	GSS			15			
2N4268	P	M	2N4352	2N4352		0.001	0.005	30	GSS			15			
2N4302	N	J	2N5457	2N4352		5.0	1.0	30	DGO			6.0			
2N4303	N	J	2N5458	2N5457		10	1.0	30	DGO			6.0			
2N4304	N	J	2N5457-9	2N5457		15	1.0	30	DGO			6.0			
2N4338	N	J	2N4220A	2N4220	0.2	0.6	0.1	50	DGO			6.0			
2N4339	N	J	2N4220A	2N4220	0.5	1.5	0.1	50	DGO			6.0			
2N4340	N	J	2N4220A-1A	2N4220	1.2	3.6	0.1	50	DGO			6.0			
2N4341	N	J	2N4221A-2A	2N4220	3.0	9.0	0.1	50	DGO			6.0			
2N4342	P	J	2N4342	2N4340	4.0	12	10	25	DGO			5.0			



FIELD-EFFECT TRANSISTORS INDEX (continued)

2N4343-2N5434

TYPE	POLARITY	CONST.	NEAREST EQUIVALENT	REF.	I <sub>DSS</sub>		I <sub>SS</sub> I <sub>DGO</sub>	Breakdown Voltage		Y <sub>F</sub>		C <sub>ISS</sub> pF	NF @ f		NOTE
					Min mA	Max mA	nA	V <sub>(BR)</sub> Volts	Sub- script	Min μmhos	Max μmhos		dB μV* √Hz	Units	
					* nA					* mmhos					
2N4343	P	J		2N4351	10	30	1.0	25	DGO			5.0			
2N4351	N	M		2N4352		0.01	0.01	25	DSS	1000		5.5			
2N4352	P	M	2N4352	2N4352		0.005	0.01	25	DSS	1000		6.5			
2N4353	P	M	2N4352	2N4352				3.0	GSS	1000		1.2			
2N4360	P	J	2N4360	2N4360	3.0	30	1.0	20	GSS	2000	4000	2.0	5.0	100	H
2N4382	P	J	2N3994	2N3993	10	30	1.0	40	GSS						
2N4391	N	J	2N4391	2N4391	50	100	0.1	40	GSS						
2N4392	N	J	2N4392	2N4391	25	75	0.1	40	GSS						
2N4393	N	J	2N4393	2N4391	5.0	30	0.1	40	GSS						
2N4416	N	J	2N4416	2N4416	5.0	15		30	GSS			4.0			
2N4416A	N	J	2N4416	2N4416	5.0	15	0.1	35	GSS	4500	7500	4.0		400	M
2N4417	N	J	2N4416	2N4416	5.0	15		30	GSS			3.5			
2N4445	N	J	MFE2012	MFE2010			3.0	25	GSS			50			
2N4446	N	J	MFE2012	MFE2010			3.0	25	GSS			50			
2N4447	N	J	MFE2012	MFE2010			3.0	20	GSS			50			
2N4448	N	J	MFE2012	MFE2010			3.0	20	GSS			50			
2N4856	N	J	2N4091	2N4091	50		0.25	40	GSS			18			
2N4856A	N	J	2N4091	2N4091	50		0.25	40	GSS			10			
2N4857	N	J	2N4092	2N4091	20	100	0.25	40	GSS			18			
2N4857A	N	J	2N4092	2N4091	20	100	0.25	40	GSS			10			
2N4858	N	J	2N4093	2N4091	8.0	80	0.25	40	GSS			18			
2N4858A	N	J	2N4093	2N4091	8.0	80	0.25	40	GSS			10			
2N4859	N	J	2N4091	2N4091	50		0.25	30	GSS			18			
2N4859A	N	J	2N4091	2N4091	50		0.25	30	GSS			10			
2N4860	N	J	2N4092	2N4091	20	100	0.25	30	GSS			18			
2N4860A	N	J	2N4092	2N4091	20	100	0.25	30	GSS			10			
2N4861	N	J	2N4093	2N4091	8.0	80	0.25	30	GSS			15			
2N4861A	N	J	2N4093	2N4091	8.0	80	0.25	30	GSS			10			
2N4867	N	J	2N4220A	2N4220	0.4	1.2	0.25	40	GSS	700	2000	25	1.0	1.0	K
2N4867A	N	J	2N4220A	2N4220	0.4	1.2	0.25	40	GSS	700	2000	25	1.0	1.0	K
2N4868	N	J	2N4220A	2N4220	1.0	3.0	0.25	40	GSS	1000	3000	25	1.0	1.0	K
2N4868A	N	J	2N4220A	2N4220	1.0	3.0	0.25	40	GSS	1000	3000	25	1.0	1.0	K
2N4869	N	J	2N4221A2A	2N4220	2.5	7.5	0.25	40	GSS	1300	4000	25	1.0	1.0	K
2N4869A	N	J	2N4221A2A	2N4220	2.5	7.5	0.25	40	GSS	1300	4000	25	1.0	1.0	K
2N4881	N	J			0.4	2.0	2.0	100	GSS			15			
2N4882	N	J			1.5	7.5	2.0	100	GSS			15			
2N4883	N	J			0.4	2.0	1.0	100	GSS			15			
2N4884	N	J			1.5	7.5	1.0	100	GSS			15			
2N4885	N	J			0.4	2.0	1.0	75	GSS			15			
2N4886	N	J			1.5	7.5	1.0	75	GSS			15			
2N4977	N	J	MFE2009	MFE2007	50		0.5	30	GSS			35			
2N4978	N	J	MFE2008	MFE2007	15		0.5	30	GSS			35			
2N4979	N	J	MFE2007	MFE2007	7.5		0.5	30	GSS			35			
2N5018	P	J	2N3993	2N3993	10		2.0	30	GSS			45			
2N5019	P	J	2N3993	2N3993	5.0		2.0	30	GSS			45			
2N5020	P	J	2N5265-6	2N5265	0.3	1.2	1.0	25	GSS			25			
2N5021	P	J	2N5266-7	2N5265	1.0	3.5	1.0	25	GSS			25			
2N5033	P	J	2N5265-7	2N5265	0.3	3.5	1.0	20	GSS	1000	5000	25	2.0	1.0	K
2N5045	N	J	MMF5,6	MMF1	0.5	8.0	0.25					8.0			
2N5046	N	J	MMF5,6	MMF1	0.5	8.0	0.25					8.0			
2N5047	N	J	MMF5,6	MMF1	0.5	8.0	0.25					8.0			
2N5078	N	J	2N4416	2N4416	4.0	25	0.25	30	GSS	4500	10000	6.0	3.0	200	M
2N5103	N	J	2N3823	2N3823	1.0	8.0	0.1	25	GSS	2000	8000	5.0	1.5	100	H
2N5104	N	J	2N3823	2N3823	2.0	6.0	0.1	25	GSS	3500	7500	5.0	1.5	100	H
2N5105	N	J	2N3823	2N3823	5.0	15	0.1	25	GSS	5000	10000	5.0	1.5	100	H
2N5114	P	J			30	90	0.5	30	GSS			25			
2N5115	P	J			15	60	0.5	30	GSS			25			
2N5116	P	J	2N3993	2N3993	5.0	25	0.5	30	GSS			25			
2N5158	N	J	MFE2012	MFE2010			1.0	40	GSS			50			
2N5159	N	J	MFE2012	MFE2010			1.0	40	GSS			50			
2N5163	N	J	MPF102	MPF102	1.0	40	1.0	25	GSS	2000	9000	12			
2N5196	N	J	MMF1,2	MMF1	0.7	7.0	0.025	50	GSS	1000	4000	6.0	1.0	100	H
2N5197	N	J	MMF1,2	MMF1	0.7	7.0	0.025	50	GSS	1000	4000	6.0	1.0	100	H
2N5198	N	J	MMF3,4	MMF1	0.7	7.0	0.025	50	GSS	1000	4000	6.0	1.0	100	H
2N5199	N	J	MMF5,6	MMF1	0.7	7.0	0.025	50	GSS	1000	4000	6.0	1.0	100	H
2N5245	N	J	2N5486	2N5484	5.0	15	1.0	30	GSS	4500	7500	4.5	2.0	100	M
2N5246	N	J	2N5485	2N5484	1.5	7.0	1.0	30	GSS	3000	6000	4.5			
2N5247	N	J	2N5486	2N5484	8.0	24	1.0	30	GSS	4500	8000	4.5			
2N5248	N	J	MPF102	MPF102	4.0	20	5.0	30	GSS	3500	6500	6.0			
2N5265	P	J	2N5265	2N5265	0.5	1.0	2.0	60	GSS	900	2700	7.0	2.5	100	H
2N5266	P	J	2N5266	2N5265	0.8	1.6	2.0	60	GSS	1000	3000	7.0	2.5	100	H
2N5267	P	J	2N5267	2N5265	1.5	3.0	2.0	60	GSS	1500	3500	7.0	2.5	100	H
2N5268	P	J	2N5268	2N5265	2.5	5.0	2.0	60	GSS	2000	4000	7.0	2.5	100	H
2N5269	P	J	2N5269	2N5265	4.0	8.0	2.0	60	GSS	4500	7500	7.0	2.5	100	H
2N5270	P	J	2N5270	2N5265	7.0	14.0	2.0	60	GSS	2500	5000	7.0	2.5	100	H
2N5277	N	J	2N3822	2N3821	2.5	12.5	5.0	150	GSS	2000	5000	25	3.0	1.0	K
2N5278	N	J	2N5364	2N5358	10	25	5.0	150	GSS	3000	6000	25	3.0	1.0	K
2N5358	N	J	2N5358	2N5358	0.5	1.0	0.1	40	GSS	1000	3000	6.0	2.5	100	H
2N5359	N	J	2N5359	2N5358	0.8	1.6	0.1	40	GSS	1200	3600	6.0	2.5	100	H
2N5360	N	J	2N5360	2N5358	1.5	3.0	0.1	40	GSS	1400	4200	6.0	2.5	100	H
2N5361	N	J	2N5361	2N5358	2.5	5.0	0.1	40	GSS	1500	4500	6.0	2.5	100	H
2N5362	N	J	2N5362	2N5358	4.0	8.0	0.1	40	GSS	2000	5500	6.0	2.5	100	H
2N5363	N	J	2N5363	2N5358	9.0	14	0.1	40	GSS	2500	6000	6.0	2.5	100	H
2N5364	N	J	2N5364	2N5358	0.5	1.5	0.2	70	GSS	2700	6500	6.0	2.5	100	H
2N5391	N	J	2N5358	2N5358	1.5	3.0	0.2	70	GSS	1500	4500	18	1.0	100	H
2N5392	N	J	2N5360	2N5358	1.0	3.0	0.2	70	GSS	2000	6000	18	1.0	100	H
2N5393	N	J	2N5360	2N5358	2.5	4.5	0.2	70	GSS	3000	6500	18	1.0	100	H
2N5394	N	J	2N5361	2N5358	4.0	6.0	0.2	70	GSS	4000	7000	18	1.0	100	H
2N5395	N	J	2N5362	2N5358	5.5	8.0	0.2	70	GSS	4500	7000	18	1.0	100	H
2N5396	N	J	2N5362	2N5358	7.5	10	0.2	70	GSS	4500	7500	18	1.0	100	H
2N5397	N	J	MFE2001	MFE2000	10	30	0.1	25	GSS	6000	10000	5.0	3.5	450	M
2N5398	N	J	MFE2001	MFE2000	5.0	40	0.1	25	GSS	5500	10000	5.5			
2N5432	N	J	MFE2012	MFE2012	150		0.2	25	GSS			30			
2N5433	N	J	MFE2012	MFE2012	100		0.2	25	GSS			30			
2N5434	N	J	MFE2012	MFE2012	30		0.2	25	GSS			30			



TYPE	POLARITY	CONST.	NEAREST EQUIVALENT	REF.	I <sub>DSS</sub>		I <sub>ESS</sub> I <sub>DGO</sub> *	Breakdown Voltage		Y <sub>fs</sub>		C <sub>ISS</sub>	NF @ f		NOTE
					Min mA	Max mA		V <sub>(BR)</sub> Volts	Sub-script	Min $\mu$ mhos	Max $\mu$ mhos		dB $\mu$ V* $\sqrt{\text{Hz}}$	Units	
					* nA					* mmhos					
2N5452	N	J	MMF1,2	MMF1	0.5	5.0	0.1	50	GSS	1000	3000	4.0	0.02*	1.0K	
2N5453	N	J	MMF1,2	MMF1	0.5	5.0	0.1	50	GSS	1000	3000	4.0	0.02*	1.0K	
2N5454	N	J	MMF3,4	MMF1	0.5	5.0	0.1	50	GSS	1000	3000	4.0	0.02*	1.0K	
2N5457	N	J	2N5457	2N5457	1.0	5.0	1.0	25	GSS	1000	5000	7.0			
2N5458	N	J	2N5458	2N5457	2.0	9.0	1.0	25	GSS	1500	5500	7.0			
2N5459	N	J	2N5459	2N5457	4.0	16	1.0	25	GSS	2000	6000	7.0			
2N5460	P	J	2N5460	2N5460	1.0	5.0	5.0	40	GSS	1000	4000	7.0	2.5	100 H	
2N5461	P	J	2N5461	2N5460	2.0	9.0	5.0	40	GSS	1500	5000	7.0	2.5	100 H	
2N5462	P	J	2N5462	2N5460	4.0	16	5.0	40	GSS	2000	6000	7.0	2.5	100 H	
2N5463	P	J	2N5463	2N5460	1.0	5.0	5.0	60	GSS	1000	4000	7.0	2.5	100 H	
2N5464	P	J	2N5464	2N5460	2.0	9.0	5.0	60	GSS	1500	5000	7.0	2.5	100 H	
2N5465	P	J	2N5465	2N5460	4.0	16	5.0	60	GSS	2000	6000	7.0	2.5	100 H	
2N5471	P	J	2N5471	2N5471	0.02	0.06	0.5	40	GSS	60	180	5.0	2.5	1.0 K	
2N5472	P	J	2N5472	2N5471	0.05	0.12	0.5	40	GSS	90	225	5.0	2.5	1.0 K	
2N5473	P	J	2N5473	2N5471	0.10	0.25	0.5	40	GSS	120	300	5.0	2.5	1.0 K	
2N5474	P	J	2N5474	2N5471	0.20	0.50	0.5	40	GSS	160	400	5.0	2.5	1.0 K	
2N5475	P	J	2N5475	2N5471	0.40	1.0	0.5	40	GSS	200	500	5.0	2.5	1.0 K	
2N5476	P	J	2N5476	2N5471	0.80	2.0	0.5	40	GSS	260	650	5.0	2.5	1.0 K	
2N5484	N	J	2N5484	2N5484	1.0	5.0	1.0	25	GSS	3000	6000	5.0	3.0	100 M	
2N5485	N	J	2N5485	2N5484	4.0	10	1.0	25	GSS	3500	7000	5.0	2.0	100 M	
2N5486	N	J	2N5486	2N5484	8.0	20	1.0	25	GSS	4000	8000	5.0	2.0	100 M	
2N5505	N	J					0.25	30	GSS	1000	3500	16	2.0	1.0 K	Dual
2N5506	P	J					0.25	30	GSS	1000	3500	16	2.0	1.0 K	Dual
2N5507	P	J					0.25	30	GSS	1000	3500	16	2.0	1.0 K	Dual
2N5508	P	J					0.25	30	GSS	1000	3500	16	2.0	1.0 K	Dual
2N5509	P	J					0.25	30	GSS	1000	3500	16	2.0	1.0 K	Dual
2N5510	P	J					0.25	30	GSS	500	3000	16	2.0	1.0 K	Dual
2N5511	P	J					0.25	30	GSS	500	3000	16	2.0	1.0 K	Dual
2N5512	P	J					0.25	30	GSS	500	3000	16	2.0	1.0 K	Dual
2N5513	P	J					0.25	30	GSS	500	3000	16	2.0	1.0 K	Dual
2N5514	P	J					0.25	30	GSS	500	3000	16	2.0	1.0 K	Dual
2N5515	N	J			0.5	7.5	0.25	40	GSS	500	3000	16	2.0	1.0 K	Dual
2N5516	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	2.0	1.0 H	Dual
2N5517	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	2.0	1.0 H	Dual
2N5518	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	2.0	1.0 H	Dual
2N5519	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	2.0	1.0 H	Dual
2N5520	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	1.0	1.0 H	Dual
2N5521	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	1.0	1.0 H	Dual
2N5522	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	1.0	1.0 H	Dual
2N5523	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	1.0	1.0 H	Dual
2N5524	N	J			0.5	7.5	0.25	40	GSS	1000	4000	25	1.0	1.0 H	Dual
2N5543	N	J	2N3822	2N3819	2.0	10	1000			750	3000	10			
2N5544	N	J	2N3822	2N3819	2.0	10	1000			750	3000	10			
2N5545	N	J	MMF1-6	MMF1	0.5	8.0	0.1			1500	6000	6.0	3.5	10 H	Dual
2N5546	N	J	MMF1-6	MMF1	0.5	8.0	0.1			1500	6000	6.0	5.0	10 H	Dual
2N5547	N	J	MMF1-6	MMF1	0.5	8.0	0.1			1500	6000	6.0			Dual
2N5548	P	M	MFE3003	MFE3001		10*	0.05			3500	6500	10			
2N5549	N	J	2N4093	2N4088	10	60	0.25	40	GSS	6000	15000	8.0			
2N5555	N	J		2N5555	15		1.0	25	GSS			5.0			
2N5556	N	J		2N5556	0.5	2.5	0.1	30	GSS	1500	6500	6.0	1.0	10 H	
2N5557	N	J		2N5556	2.0	5.0	0.1	30	GSS	1500	6500	6.0	1.0	10 H	
2N5558	N	J		2N5556	4.0	10	0.1	30	GSS	1500	6500	6.0	1.0	10 H	
2N5561	N	J			1.0	10	0.1	50	GSS			7.0	1.0	10 H	MP
2N5562	N	J			1.0	10	0.1	50	GSS			7.0	1.0	10 H	MP
2N5563	N	J			1.0	10	0.1	50	GSS			7.0	1.0	10 H	MP
2N5564	N	J			5.0	30	0.1	40	GSS			12	1.0	10 H	MP
2N5565	N	J			5.0	30	0.1	40	GSS			12	1.0	10 H	MP
2N5566	N	J			5.0	30	0.1	40	GSS			12	1.0	10 H	MP
2N5592	N	J			1.0	10	0.25	50	GSS			20	2.0	10 H	
2N5593	N	J			1.0	10	0.25	50	GSS			20	6.0	10 H	
2N5594	N	J			1.0	10	0.25	50	GSS			20	10	10 H	
2N5638	N	J				50	1.0	30	GSS				10		
2N5639	N	J				25	1.0	30	GSS				10		
2N5640	N	J				5.0	1.0	30	GSS				10		
2N5647	N	J			0.3	0.6	0.01	50	GSS			3.0	1.0	1.0 K	
2N5648	N	J	2N5556	2N5555	0.5	1.0	0.01	50	GSS			3.0	1.0	1.0 K	
2N5649	N	J	2N5556	2N5555	0.8	1.6	0.01	50	GSS			3.0	1.0	1.0 K	
2N5653	N	J	2N5556	2N5555	40		1.0	30	GSS			10	2.5		
2N5654	N	J			15		1.0	30	GSS			10	2.5		
2N5668	N	J		2N5668	1.0	5.0	2.0	25	GSS			7.0	2.5	100 M	
2N5669	N	J		2N5668	4.0	10	2.0	25	GSS			7.0	2.5	100 M	
2N5670	N	J		2N5669	8.0	20	2.0	25	GSS			7.0	2.5	100 M	
2N5797	P	J			0.02	0.10	3.0	40	GSS	60*	225*	5.0			MP
2N5798	P	J			0.08	0.40	3.0	40	GSS	100*	440*	5.0			MP
2N5799	P	J			0.25	1.00	3.0	40	GSS	160*	500*	5.0			MP
2N5800	P	J			0.70	2.00	3.0	40	GSS	250*	700*	5.0			MP
2N5801	N	J			2.0	15	0.1	-40	GSS			15	1.0	100 H	MP
2N5802	N	J			10	40	0.1	-40	GSS			15	1.0	100 H	MP
2N5803	N	J			30	80	0.1	-40	GSS			15	1.0	100 H	MP
2N5902	N	J			0.03	0.5	0.005	-40	GSS	70	250	3.0	3.0	100 H	MP
2N5903	N	J			0.03	0.5	0.005	-40	GSS	70	250	3.0	3.0	100 H	MP
2N5904	N	J			0.03	0.5	0.005	-40	GSS	70	250	3.0	3.0	100 H	MP
2N5905	N	J			0.03	0.5	0.005	-40	GSS	70	250	3.0	3.0	100 H	MP
2N5906	N	J			0.03	0.5	0.002	-40	GSS	70	250	3.0	1.0	100 H	MP
2N5907	N	J			0.03	0.5	0.002	-40	GSS	70	250	3.0	1.0	100 H	MP
2N5908	N	J			0.03	0.5	0.002	-40	GSS	70	250	3.0	1.0	100 H	MP
2N5909	N	J			0.03	0.5	0.002	-40	GSS	70	250	3.0	1.0	100 H	MP
2N5949	N	M			12	18	-1.0	30	GSS	3.0	7.5	6.0	2.0	1.0 K	
2N5950	N	M			10	15	-1.0	30	GSS	3.0	7.5	6.0	2.0	1.0 K	
2N5951	N	M			7.0	13	-1.0	30	GSS	3.0	6.5	6.0	2.0	1.0 K	
2N5952	N	M			4.0	8.0	-1.0	30	GSS	1.0	6.5	6.0	2.0	1.0 K	
2N5953	N	M			2.5	5.0	-1.0	30	GSS	1.0	6.5	6.0	2.0	1.0 K	



## 3N89-3N313

## FIELD-EFFECT TRANSISTORS INDEX (continued)

TYPE	POLARITY	CONST.	NEAREST EQUIVALENT	REF.	I <sub>DSS</sub>		I <sub>GSS</sub> DGO* nA	Breakdown Voltage		Y <sub>fs</sub>		C <sub>iss</sub> pF	NF	@ f	NOTE	
					Min mA	Max mA		V <sub>(BR)</sub> Volts	Sub- script	Min μmhos	Max μmhos					
					* nA					* mmhos						
3N89	P	J			0.5	2.5	5.0	30		450	1300	3.0			Dual Dual	
3N96	P	J			0.5	2.5	5.0	30		450	1300	4.0				
3N97	P	J			0.5	2.5	5.0	30		450	1300	4.0				
3N98	N	M	MFE3004-5	MFE3004	3.5	7.7	0.05	32		1000	3000	7.0				
3N99	N	M	MFE3004-5	MFE3004	5.0	10.5	0.05	32		1000	4500	7.0				
3N124	N	J	3N124	3N124	0.2	2.0	0.25	50	GSS	500	2000	14	4.0	1.0		K
3N125	N	J	3N125	3N124	1.5	4.5	0.25	50	GSS	800	2400	14	4.0	1.0		K
3N126	N	J	3N126	3N124	3.0	9.0	0.25	50	GSS	1200	3600	14	4.0	1.0		K
3N128	N	M	MFE3004-5	MFE3004	5.0	25	0.05			5000	12000	7.0	5.0	200		M
3N138	N	M	MFE3004-5	MFE3004			0.010	45	GD			5.0				
3N139	N	M	MFE3004-5	MFE3004	5.0	25	1.0	45	GD	3000	7500	7.0				
3N140	N	M	3N140	3N140	5.0	30	1.0	20	DS			7.0	4.5	200	M	
3N141	N	M	MFE3006-7	MFE3006	5.0	30	1.0	20	DS			7.0				
3N142	N	M	MFE3004-5	MFE3004	5.0	50	5.0	20	DS			10				
3N143	N	M	MFE3004-5	MFE3004	10	50	1.0					7.0				
3N145	P	M	2N4352	2N4352				30	DB							
3N146	P	M	3N157A	3N157				30	DB							
3N147	P	M						30	DB							
3N148	P	M						30	DB							
3N149	P	M	3N157A-8A	3N157				30	DB							
3N150	P	M	3N157A-8A	3N157				30	DB							
3N151	P	M			-5.0*							12	10	100	H	
3N152	N	M	MFE3004-5	MFE3004	5.0	30	1.0						3.5	200	M	
3N153	N	M	MFE3004-5	MFE3004			0.05					8.0				
3N154	N	M	MFE3004-5	MFE3004	10	25	0.05						5.0	200	M	
3N155	P	M	3N155	3N155		1.0	1.0	35	DSS	1000	4000	5.0				
3N155A	P	M	3N155A	3N155		0.25	1.0	35	DSS	1000	4000	5.0				
3N156	P	M	3N156	3N155		1.0	1.0	35	DSS	1000	4000	5.0				
3N156A	P	M	3N156	3N155		0.25	1.0	35	DSS	1000	4000	5.0				
3N157	P	M	3N157	3N157		1.0	0.010	35	DSS	1000	4000	5.0				
3N157A	P	M	3N157A	3N157		0.25	0.010	50	DSS	1000	4000	5.0				
3N158	P	M	3N158	3N157		1.0	0.010	35	DSS	1000	4000	5.0				
3N159	N	M	3N158A	3N157		0.25	0.010	50	DSS	1000	4000	5.0				
3N160	P	M	MFE3007	MFE3007	5.0	30	1.0			7000	18000	7.0	3.5	200	M	
3N161	P	M	MFE3003	MFE3001		10*	0.01			3500	6500	10				
3N162	P	M	MFE3003	MFE3001		10*				3500	6500	10				
3N163	P	M	MFE3003	MFE3001		150*						20				
3N164	P	M	MFE3003	MFE3001		0.2*	0.01					2.5				
						0.4*	0.01					2.5				
3N165	P	M				0.2*	0.01					3.0				
3N166	P	M				0.2*	0.01					3.0				
3N167	P	M				-0.5*						35				
3N168	P	M				-1.0*						35				
3N169	N	M	3N169			10*						5.0				
3N170	N	M	3N169			10*						5.0				
3N171	N	M	3N169			10*						5.0				
3N172	P	M				0.4*						3.5				
3N173	P	M				10*						3.5				
3N174	P	M	2N4352	2N4352		5.0*	0.0025					4.0				
3N175	N	M				5.0*	0.2					5.0				
3N176	N	M				10*	0.2					5.0				
3N177	N	M				25*	0.2					7.0				
3N178	P	M				0.5*	0.2					3.5				
3N179	P	M				1.0*						4.5				
3N180	P	M				1.0*						5.0				
3N181	P	M				0.5*						25				
3N182	P	M				2.5*						25				
3N183	P	M				10*						30				
3N184	P	M				2.0*						9.0				
3N185	P	M				5.0*						10				
3N186	P	M				10*						11				
3N188	P	M				0.2*						4.5				
3N189	P	M				0.2*						4.5				
3N190	P	M				0.2*	0.01					4.5				
3N191	P	M				0.2*	0.01					4.5				
3N192	N	M			3.0	30	-1.0	-6.0	GSSR	8000	24000	6.0				
3N193	N	M			1.0	20	-1.0	-6.0	GSSR	6000	22000	7.0				
3N200	N	J			0.5	12	-50	6.5	GSS							
3N201	N	J			6.0	30	-10	6.0	GSS	8.0	20		4.5	200	M	
3N202	N	J			6.0	30	-10	6.0	GSS	8.0	20		4.5	200	M	
3N203	N	J			3.0	15	-10	6.0	GSS	7.0	15		6.0	45	M	
3N204	N	S			6.0	30	10	30	GSS	10*	22*		3.5			
3N205	N	S			6.0	30	10	30	GSS	10*	22*					
3N206	N	S			3.0	15	10	30	GSS	10*	22*					
3N207	P	S				10*	200			7	17*		4.0			
3N208	P	S				10*	1.0	30	GSSF			4.0				
3N211	N	S			6.0	40	10	-6.0	GSS	17*	40*		3.5	45	M	
3N312	N	S			6.0	40	10	-6.0	GSS	17*	40*		3.5	45	M	
3N313	N	S			6.0	40	10	-6.0	GSS	17*	40*		3.5	45	M	



# PROGRAMMABLE UNIJUNCTION TRANSISTORS

## KEY

TYPE	REPLACE- MENT	REFERENCE	$I_p$	$I_{GAO}$	$I_V$	$V_{GKF}$	$P_F$	$V_O$	$V_F$	$I_T$	$I_{TRM}$	$T_{stg}$
Numerical Listings of 2N Registered Type Numbers												
Type number of recommended replacement or of nearest electrical equivalent fully characterized in this book												
Reference device number indicates specific Data Sheet on which device is characterized												
Peak Current												
Gate to Anode Leakage Current												
Valley Current												
Gate to Cathode Forward Voltage												
Forward Power Dissipation @ 25°C												
Peak Output Voltage												
Forward Voltage												
DC Forward Anode Current												
Repetitive Peak Forward Current												
Storage Temperature Range												

## PROGRAMMABLE UNIJUNCTION TRANSISTORS – PUT

2N6027-2N6138

TYPE	Replace- ment	REF.	$I_p$ Peak Current $R_G = 10\text{ k}\Omega$ $\mu\text{A}$ (Max)		$I_{GAO}$ Leakage Current @ 40 V nA (Max)	$I_V$ Valley Current $R_G = 10\text{ k}\Omega$ $\mu\text{A}$ (Min)		$R_G = 1.0\text{ M}\Omega$ $\mu\text{A}$ (Max)	$V_{GKF}$ Gate to Cathode Forward Voltage Volts (Max)	$P_F$ mW	$V_O$ Min Output Voltage Volts	$V_F$ Forward Voltage $V_F$ @ $I_F$ Volts mA		$I_T$ DC Anode Current mA (Max)	$I_T$ (pulse) Peak Anode Current 20 $\mu\text{s}$ *10 $\mu\text{s}$ 1.0% DC Amp (Max)	$T_{stg}$ Storage Temp. Range °C
2N6027	2N6027	2N6027	5.0	2.0	10	70	50		+ 40	300	6.0	1.5	50	150	2.0	-55°C to
2N6028	2N6028	2N6027	1.0	0.15	10	25	25		+ 40	300	6.0	1.5	50	150	2.0	+150°C
2N6116	2N6116	2N6116	5.0	2.0	5.0	70	50		40	250	6.0	1.5	50	200	2.0	-65°C
2N6117	2N6117	2N6116	2.0	0.3	5.0	50	50		40	250	6.0	1.5	50	200	2.0	to 0°C
2N6118	2N6118	2N6116	1.0	0.15	5.0	50	25		40	250	6.0	1.5	50	200	2.0	+200°C
2N6119	2N6116	2N6116	5.0	2.0	10	70	50		40	400	9.0	1.0	50	300	8.0*	-55°C to
2N6120	2N6118	2N6116	1.0	0.15	10	25	25		40	400	9.0	1.0	50	300	8.0*	+150°C
2N6137			5.0	2.0	10	70	50		40	400	9.0	1.0	50	300	8.0*	-55°C to
2N6138			5.0	2.0	10	70	50		100	400	9.0	1.0	50	300	8.0*	+150°C



## UNIJUNCTION TRANSISTORS

This table contains a numerical listing and short-form specifications for unijunction transistors with EIA-registered 2N numbers.

### KEY

TYPE	REPLACEMENT	REF	$P_D$ (mW)	$R_{BB}$	$\eta$	$I_V$ (Min) mA	$I_P$ (Max) ( $\mu$ A)	$I_{EO} @ V_{B2E}$ ( $\mu$ A @ V Max)	$V_{EB1} \text{ (sat)}$ $I_E @ 50 \text{ mA}$
Numerical Listing of Registered Type Numbers			Power Dissipation @ 25°C					Emitter Reverse Current at indicated $V_{B2E}$	
Type number of nearest electrical equivalent fully characterized in this book			Interbase Resistance						
			Intrinsic Standoff Ratio						
Reference device number indicates specific Data Sheet on which device is characterized			Valley Current					Emitter Saturation Voltage	
			Peak Point Current						



# UNIJUNCTION TRANSISTORS INDEX

2N489-2N6115

TYPE	REPLACEMENT	REF.	P <sub>D</sub> (mW)	R <sub>BB</sub> (kΩ)	η	I <sub>V</sub> (min) (mA)	I <sub>P</sub> (max) (μA)	I <sub>EO</sub> @ V <sub>B2E</sub> (μA @ V max)	V <sub>EB</sub> (SAT) I <sub>E</sub> @ 50 mA
2N489			450	6.8	0.62	8.0	20	12 @ 60	5.0
2N489A			450	6.8	0.62	8.0	15	12 @ 60	4.0
2N489B			450	6.8	0.62	8.0	6.0	0.2 @ 60	4.0
2N490			450	9.1	0.62	8.0	20	12 @ 60	5.0
2N490A			450	9.1	0.62	8.0	15	12 @ 60	4.0
2N490B			450	9.1	0.62	8.0	6.0	0.2 @ 60	4.0
2N490C			450	9.1	0.51				
2N491			450	6.8	0.68	8.0	20	12 @ 60	5.0
2N491A			450	6.8	0.68	8.0	15	12 @ 60	4.3
2N491B			450	6.8	0.68	8.0	6.0	0.2 @ 60	4.3
2N492			450	9.1	0.68	8.0	20	12 @ 60	5.0
2N492A			450	9.1	0.68	8.0	15	12 @ 60	4.3
2N492B			450	9.1	0.68	8.0	6.0	0.2 @ 60	4.3
2N492C			450	9.1	0.56				
2N493			450	6.8	0.75	8.0	20	12 @ 60	5.0
2N493A			450	6.8	0.75	8.0	15		
2N493B			450	6.8	0.75	8.0	6.0	0.2 @ 60	5.0
2N494			450	9.1	0.75	8.0	20	12 @ 60	5.0
2N494A			450	9.1	0.75	8.0	15	12 @ 60	4.6
2N494B			450	9.1	0.75	8.0	6.0	0.2 @ 60	4.6
2N494C			450	9.1	0.62	8.0	2.0	0.02 @ 60	4.6
2N1671			450	9.1	0.62	8.0	25	12 @ 30	5.0
2N1671A			450	9.1	0.62	8.0	25	12 @ 30	5.0
2N1671B			450	9.1	0.62	8.0	6.0	0.2 @ 30	5.0
2N1671C			450	4.1 -9.1					
2N2160			450	4.0 -12	0.47 -0.80	8.0	25	12 @ 30	
2N2417			390	0.68	0.62	8.0	20	12 @ 60	5.0
2N2417A			390	0.68	0.62	8.0	20	12 @ 60	4.0
2N2417B			300	6.8	0.51 -0.62	8.0	6.0	0.2 @ 30	4.0
2N2418			390	0.68	0.62	8.0	20	12 @ 60	5.0
2N2418A			390	9.1	0.62	8.0	20	12 @ 60	4.0
2N2418B			300	9.1	0.51 - 0.62	8.0	6.0	0.2 @ 60	4.0
2N2419			390	4.7 -6.8	0.68	8.0	20	12 @ 60	5.0
2N2419A			390	6.8	0.68	8.0	20	12 @ 60	4.3
2N2419B			300	6.8	0.56 -0.68	8.0	6.0	0.2 @ 30	4.3
2N2420			390	9.1	0.68	8.0	20	12 @ 60	5.0
2N2420A			390	9.1	0.68	8.0	20	12 @ 60	4.3
2N2420B			300	9.1	0.56 -0.68	8.0	6.0	0.2 @ 30	4.3
2N2421			390	6.8	0.75	8.0	20	12 @ 60	5.0
2N2421A			390	6.8	0.75	8.0	20	12 @ 60	4.6
2N2421B			300	6.8	0.62 -0.75	0.2	6.0	0.2 @ 30	4.6
2N2422			390	9.1	0.75	8.0	20	12 @ 60	5.0
2N2422A			390	9.1	0.75	8.0	20	12 @ 60	4.6
2N2422B			300	9.1	0.62 -0.75	8.0	6.0	0.2 @ 30	
2N2646	2N2646	2N2646	300	4.7 (min)	0.56	4.0	25	12 @ 30	2.0
2N2647	2N2647	2N2646	300	4.7 (min)	0.68	8.0	2.0	0.2 @ 30	2.0
2N2840			300	4.7 -9.1	0.4 -0.85	0.70	10	1.0 @ 30	
2N3406			450			8.0			
2N3479			400	4.7 -9.1	0.47 -0.62	6.0	20	12 @ 30	5.0
2N3480			400	9.1	0.75	4.0	15	12 @ 30	5.0
2N3481			400	9.1	0.85	6.0	15	12 @ 30	5.0
2N3482			400	4.7 -6.8	0.51 -0.62	8.0	2.0	0.02 @ 30	5.0
2N3483			400	9.1	0.72	8.0	2.0	1.0 @ 30	5.0
2N3484			400	9.1	0.85	8.0	2.0	0.2 @ 30	5.0
2N3679			250	9.1	0.80	4.2			
2N3980	2N3980	2N3980	360	8.0		2.0	2.0	0.1 @ 30	2.5
2N4851	2N4851	2N4851	300	4.7 (min)	0.56 (min)	2.0	2.0	0.1 @ 30	2.5
2N4852	2N4852	2N4851	300	4.7 (min)	0.70 (min)	4.0	2.0	0.1 @ 30	2.5
2N4853	2N4853	2N4851	300	4.7 (min)	0.70 (min)	6.0	0.4	0.05 @ 30	2.5
2N4870	2N4870	2N4870	300	4.0 (min)	0.56 (min)	2.0	5.0	0.05 @ 30	2.5
2N4871			300	4.0 (min)	0.70 (min)	4.0	5.0	0.05 @ 30	2.5
2N4891	MU4891	MU4891	300	4.0 (min)	0.55 (min)	2.0	5.0	0.01 @ 30	4.0
2N4892	MU4892	MU4891	300	4.0 (min)	0.51 (min)	4.0	2.0	0.01 @ 30	4.0
2N4893	MU4893	MU4891	300	4.0 (min)	0.55 (min)	2.0	2.0	0.01 @ 30	4.0
2N4894	MU4894	MU4891	300	4.0 (min)	0.74 (min)	2.0	1.0	0.01 @ 30	4.0
2N4947			360	4.0 -9.1	0.51 -0.69	4.0	2.0	0.01 @ 30	2.5
2N4948	2N4948	2N4948	360	4.0 (min)	0.55 (min)	2.0	2.0	0.01 @ 30	2.5
2N4949	2N4949	2N4948	360	4.0 (min)	0.74 (min)	2.0	1.0	0.01 @ 30	2.5
2N5431	2N5431	2N5431	360	6.0 -8.5	0.72 -0.80	2.0	4.0		3.0
2N6114			300	5.5/8.2	0.58/0.62	1.0	5.0	0.01 5.0	1.5
2N6115			300	5.0/2.5	0.58/0.62	1.0	15	0.1 5.0	1.5



# OPTOELECTRONIC DEVICES

The following table provides a numerical index and shortform specifications for EIA-registered 4N type numbers.

## KEY

MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS						
Type	Material	Polarity	Ref.	Use	P <sub>D</sub> @ 25°C	Ref. Point T <sub>J</sub> °C	I <sub>C</sub> (on) mA Min	V <sub>CE</sub> (sat) Volts Max	V <sub>ISO</sub> Volts Min	t <sub>r</sub> + t <sub>f</sub> μs Max	Frequency Response kHz Typ	
numerical Listings of 4N Numbers											Frequency Response	
S — Silicon G — Germanium GA — Gallium Arsenide GAP — Gallium Arsenide Phosphide											t <sub>r</sub> = Rise Time t <sub>f</sub> = Fall Time	
N = n-channel P = p-channel												
Reference device number indicates specific Data Sheet on which device is charac- terized.												
PD = Photo Detector PT = Photo Transistors RD = Radiation Detector OC = Optical Coupler VLED = Visible Light Emitting Diode ILED = Infrared Light Emitting Diode											Isolation Voltage	
Power Dissipation at 25°C Units:       M = milliwatts W = watts Ref. Point: A, C, J, S, Indicates Ambient, Case, Junction or Stud.											Collector-Emitter Saturation Voltage	
Maximum Operating Junction Temperature							On-State Collector Current					

Type	Material	Polarity	Ref.	Use	P <sub>D</sub> @ 25°C	Ref. Point T <sub>J</sub> °C	I <sub>C</sub> (on) mA Min	V <sub>CE</sub> (sat) Volts Max	V <sub>ISO</sub> Volts Min	t <sub>r</sub> + t <sub>f</sub> μs Max	Frequency Response kHz Typ
4N22	S	NPN		PT	300M	C	2.5	0.3	-	30	-
4N23	S	NPN		PT	300M	C	6.0	0.3	-	30	-
4N24	S	NPN		PT	300M	C	10	0.3	-	40	-



# IN-HOUSE NON-REGISTERED DEVICES

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The following glossary of Motorola prefixes and a brief description of non-registered device types is presented to aid the reader.

Prefix	Description
1/4M	Diode — Zener
.4M	Diode — Zener
1M	Diode — Zener
1.5M	Diode — Zener
5M	Diode — Zener
10M	Diode — Zener
50M	Diode — Zener
BB	Diode — Tuning (Varactor)
BU	Transistor — Si Power
MA	Transistor — Ge Milliwatt
MAC	Thyristor — (Triac)
MBD	Diode — Hot Carrier
MBI	Diode — Micro-I — Hot Carrier
MBS	Bidirectional Switch (Trigger)
MC	Integrated Circuit — Linear/Digital
MCA	Reference Amplifier Assembly
MCB	Integrated Circuit — Beam Lead Flat Pack
MCBC	Integrated Circuit — Beam Lead Chip
MCC	Integrated Circuit — Linear Chip
MCE	Integrated Circuit — Dielectrically Isolated
MCH	Integrated Circuit — Linear Hybrid Power
MCL	Diode — Current Limiting
MCM	Integrated Circuit — Memories
MCR	Thyristor (Silicon Controlled Rectifier)
MD	Transistor — Dual Metal Can (Multiple Device)
MDA	Assemblies — Rectifier Assemblies — Diode
MFC	Functional Circuit — Digital/Linear
MFE	Transistor — Field-Effect — Metal Can
MHQ	Transistor — Ceramic Quad Dual-In-Line
MHW	Transistor — RF and Microwave Hybrids
MJ	Transistor — Si Power
MJC	Unencapsulated Si Power
MJE	Transistor — Si Power — Plastic
MLED	Optoelectronics — Light-Emitting Diode
MLM	Integrated Circuit — Linear Monolithic



MM	Transistor — Small-Signal
	Transistor — RF Power
MMCD	Unencapsulated — Si Switching Diodes
MMCF	Unencapsulated — Flip-Chip Small-Signal
MMCFD	Unencapsulated Flip-Chip Diode
MMCM	Transistor — Micro-T Small-Signal (Ceramic)
MMCQ	Unencapsulated Thin-Film Capacitors
MMCR	Unencapsulated — Thin-Film Resistors
MMCS	Unencapsulated — Small-Signal Transistors
MMD	Diode — Switching
MMF	Transistor — Field-Effect Matched Pair
MMT	Transistor — Micro-T Small-Signal (Plastic)
MOC	Optoelectronics — Coupler
MOR	Optoelectronics — Readout
MP	Transistor — Ge Power
MPF	Transistor — Field-Effect — Plastic
MPI	Diode — Micro-I PIN (Switching)
MPM	Transistor — Small-Signal Plastic
MPN	Diode — PIN (Switching)
MPQ	Transistor — Plastic Quad Dual In-Line
MPS	Transistor — Plastic Small-Signal
MPS-A	
MPS-H	
MPS-K	(Kits)
MPS-L	
MPS-U	(Uni watt)
MPT	Trigger — Plastic Bilateral
MPU	Transistor — Programmable Unijunction
MPZ	Transient Suppressor (Power Zener Diode)
MQ	Transistor — Quad Flat Pack
MR	Rectifier
MRA	Rectifier — Power
MRD	Optoelectronics (Photo, Transistor, Detector, Diode)
MRF	Transistor — RF and Microwave
MSD	Diode — Dual — Plastic To-92
MU	Transistor — Unijunction
MUS	Transistor — Unidirectional Switch
MV	Diode — Tuning (Varactor)
MVI	Diode — Micro-I Tuning (Varactor)
MVS	Voltage Stabilizer Diode
MZ	Diode — Zener
MZC	Unencapsulated — Diode — Zener



# RECTIFIERS, ZENER DIODES, SIGNAL DIODES and REFERENCE DIODES

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house, non-registered rectifiers, zener diodes, signal diodes and reference diodes.

## KEY

				RECTIFIERS $V_R$ = DC Blocking Voltage $V_F$ = Average Forward Voltage Drop $I_O$ = Average Rectifier Forward Current $I_R$ = Average Reverse Current $I_{FSM}$ = Peak Surge Current	ZENER DIODES $V_Z(\text{Nom})$ = Nominal Zener Breakdown Voltage (Volts) $I_{ZT}$ = Test Current for Zener Voltage (mA) $Tol$ = Tolerance for Specified Nominal Zener Breakdown Voltage $P_D$ = Maximum Power Dissipation $M$ = Milliwatts $W$ = Watts
TYPE	MATERIAL	REF.	IDENTIFICATION	RECTIFIERS	ZENER DIODES
				$V_R$ Volts $V_F$ Volts $I_O$ Amps $I_R$ mA $I_{FSM}$ Amps	$V_Z(\text{nom})$ $I_{ZT}$ mA $Tol$ $V_{Z\pm\%}$ $P_D$
				SIGNAL DIODES	REFERENCE DIODES
				PRV Volts $V_F @ I_F$ Volts $I_R$ $t_{rr}$ ( $\mu s$ )	$V_Z(\text{nom})$ $T_C$ $^{\circ}C$ $I_{ZT}$ mA Temp Range
Numerical Listing of Registered Type Numbers  S = Silicon G = Germanium SE = Selenium   Reference device number indicates specific Data Sheet on which device is characterized.				<b>SHADING INDICATES SIGNAL DIODES</b>  PRV = Peak Reverse Voltage $V_F @ I_F$ = Maximum Forward Voltage at Indicated Forward current – $M$ = Milliamp, $A$ = amp $I_R$ = Reverse Current – $M$ = milliamp, $\mu$ = microamp $N$ = nanoamp $t_{rr}$ = Reverse Recovery Time	<b>SHADING INDICATES REFERENCE DIODES</b>  $V_Z(\text{Nom})$ = Nominal Zener Breakdown Voltage (Volts) $T_C$ = Average Temperature Coefficient over Temperature Range $I_{ZT}$ = Test Current for Zener Voltage (mA) Temp Range = Operating Range of Average $T_C$
The codes listed below define the listed device and indicates the appropriate specification column heading. . R – Rectifiers, Fast Recovery DZ – Diode, Zener DR – Diode, Reference DS – Diode, Signal					



## DIODE, RECTIFIER INDEX

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>zt</sub> mA	Temp Range
¼M2.4AZ		¼M2.4AZ	DZ						2.4	10	20	25W
¼M2.7AZ		¼M2.4AZ	DZ						2.7	10	20	25W
¼M3.0AZ		¼M2.4AZ	DZ						3.0	10	20	25W
¼M3.3AZ		¼M2.4AZ	DZ						3.3	10	20	25W
¼M3.6AZ		¼M2.4AZ	DZ						3.6	10	20	25W
¼M3.9AZ		¼M2.4AZ	DZ						3.9	10	20	25W
¼M4.3AZ		¼M2.4AZ	DZ						4.3	10	20	25W
¼M4.7AZ		¼M2.4AZ	DZ						4.7	10	20	25W
¼M5.1AZ		¼M2.4AZ	DZ						5.1	10	20	25W
¼M5.6AZ		¼M2.4AZ	DZ						5.6	10	20	25W
¼M6.2AZ		¼M2.4AZ	DZ						6.2	10	20	25W
¼M6.8Z		¼M2.4AZ	DZ						6.8	9.2	20	25W
¼M7.5Z		¼M2.4AZ	DZ						7.5	8.3	20	25W
¼M8.2Z		¼M2.4AZ	DZ						8.2	7.6	20	25W
¼M9.1Z		¼M2.4AZ	DZ						9.1	6.9	20	25W
¼M10Z		¼M2.4AZ	DZ						10	6.3	20	25W
¼M11Z		¼M2.4AZ	DZ						11	5.7	20	25W
¼M12Z		¼M2.4AZ	DZ						12	5.2	20	25W
¼M13Z		¼M2.4AZ	DZ						13	4.8	20	25W
¼M14Z		¼M2.4AZ	DZ						14	4.5	20	25W
¼M15Z		¼M2.4AZ	DZ						15	4.2	20	25W
¼M16Z		¼M2.4AZ	DZ						16	3.9	20	25W
¼M17Z		¼M2.4AZ	DZ						17	3.7	20	25W
¼M18Z		¼M2.4AZ	DZ						18	3.5	20	25W
¼M19Z		¼M2.4AZ	DZ						19	3.3	20	25W
¼M20Z		¼M2.4AZ	DZ						20	3.1	20	25W
¼M22Z		¼M2.4AZ	DZ						22	2.8	20	25W
¼M24Z		¼M2.4AZ	DZ						24	2.6	20	25W
¼M25Z		¼M2.4AZ	DZ						25	2.5	20	25W
¼M27Z		¼M2.4AZ	DZ						27	2.3	20	25W
¼M30Z		¼M2.4AZ	DZ						30	2.1	20	25W
¼M33Z		¼M2.4AZ	DZ						33	1.9	20	25W
¼M36Z		¼M2.4AZ	DZ						36	1.7	20	25W
¼M39Z		¼M2.4AZ	DZ						39	1.6	20	25W
¼M43Z		¼M2.4AZ	DZ						43	1.5	20	25W
¼M45Z		¼M2.4AZ	DZ						45	1.4	20	25W
¼M47Z		¼M2.4AZ	DZ						47	1.3	20	25W
¼M50Z		¼M2.4AZ	DZ						50	1.2	20	25W
¼M52Z		¼M2.4AZ	DZ						52	1.2	20	25W
¼M56Z		¼M2.4AZ	DZ						56	1.1	20	25W
¼M62Z		¼M2.4AZ	DZ						62	1.0	20	25W
¼M68Z		¼M2.4AZ	DZ						68	0.92	20	25W
¼M75Z		¼M2.4AZ	DZ						75	0.83	20	25W
¼M82Z		¼M2.4AZ	DZ						82	0.76	20	25W
¼M91Z		¼M2.4AZ	DZ						91	0.69	20	25W
¼M100Z		¼M2.4AZ	DZ						100	0.63	20	25W
¼M105Z		¼M2.4AZ	DZ						105	0.60	20	25W
¼M110Z		¼M2.4AZ	DZ						110	0.57	20	25W
¼M120Z		¼M2.4AZ	DZ						120	0.52	20	25W
¼M130Z		¼M2.4AZ	DZ						130	0.48	20	25W



# DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> %	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	I <sub>F</sub> mA	I <sub>R</sub> mA	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>zt</sub> mA	Temp Range
1M140Z		1M2.4AZ	DZ						140	0.45	20	25W
1M150Z		1M2.4AZ	DZ						150	0.42	20	25W
1M175Z		1M2.4AZ	DZ						175	0.36	20	25W
1M200Z		1M2.4AZ	DZ						200	0.31	20	25W
4M64FR10			DS	6.0	1.0	100M	0.1	0.2				
4M1.36FR2			DS	6.0	1.0	100M	0.1	0.2				
4M2.04FR5			DS	6.0	1.0	100M	0.1	0.2				
4M2.04FR2			DS	6.0	1.0	100M	0.1	0.2				
1M3.3AZ10		1N3821	DZ						3.3	76	10	1.0W
1M3.6AZ10		1N3821	DZ						3.6	69	10	1.0W
1M3.9AZ10		1N3821	DZ						3.9	64	10	1.0W
1M4.3AZ10		1N3821	DZ						4.3	58	10	1.0W
1M4.7AZ10		1N3821	DZ						4.7	53	10	1.0W
1M5.1AZ10		1N3821	DZ						5.1	49	10	1.0W
1M5.6AZ10		1N3821	DZ						5.6	45	10	1.0W
1M6.2AZ10		1N3821	DZ						6.2	41	10	1.0W
1M6.8AZ10		1N3821	DZ						6.8	37	10	1.0W
1M7.5AZ10		1N3821	DZ						7.5	34	10	1.0W
1M6.8Z		1N3821	DZ						6.8	37	10	1.0W
1M7.5Z		1N3821	DZ						7.5	34	10	1.0W
1M8.2Z		1N3821	DZ						8.2	31	10	1.0W
1M9.1Z		1N3821	DZ						9.1	28	10	1.0W
1M10Z		1N3821	DZ						10	25	10	1.0W
1M11Z		1N3821	DZ						11	23	10	1.0W
1M12Z		1N3821	DZ						12	21	10	1.0W
1M13Z		1N3821	DZ						13	19	10	1.0W
1M15Z		1N3821	DZ						15	17	10	1.0W
1M16Z		1N3821	DZ						16	15.5	10	1.0W
1M18Z		1N3821	DZ						18	14	10	1.0W
1M20Z		1N3821	DZ						20	12.5	10	1.0W
1M22Z		1N3821	DZ						22	11.5	10	1.0W
1M24Z		1N3821	DZ						24	10.5	10	1.0W
1M27Z		1N3821	DZ						27	9.5	10	1.0W
1M30Z		1N3821	DZ						30	8.5	10	1.0W
1M33Z		1N3821	DZ						33	7.5	10	1.0W
1M36Z		1N3821	DZ						36	7.0	10	1.0W
1M39Z		1N3821	DZ						39	6.5	10	1.0W
1M43Z		1N3821	DZ						43	6.0	10	1.0W
1M47Z		1N3821	DZ						47	5.5	10	1.0W
1M51Z		1N3821	DZ						51	5.0	10	1.0W
1M56Z		1N3821	DZ						56	4.5	10	1.0W
1M62Z		1N3821	DZ						62	4.0	10	1.0W
1M68Z		1N3821	DZ						68	3.7	10	1.0W
1M75Z		1N3821	DZ						75	3.3	10	1.0W
1M82Z		1N3821	DZ						82	3.0	10	1.0W
1M91Z		1N3821	DZ						91	2.8	10	1.0W
1M100Z		1N3821	DZ						100	2.5	10	1.0W
1M110Z		1N3821	DZ						110	2.3	10	1.0W
1M120Z		1N3821	DZ						120	2.0	10	1.0W
1M130Z		1N3821	DZ						130	1.9	10	1.0W
1M150Z		1N3821	DZ						150	1.7	10	1.0W
1M160Z		1N3821	DZ						160	1.6	10	1.0W
1M180Z		1N3821	DZ						180	1.4	10	1.0W
1M200Z		1N3821	DZ						200		10	1.0W
1M3.3ZS10		1N4728	DZ						3.3	76	10	1.0W
1M3.6ZS10		1N4728	DZ						3.6	69	10	1.0W
1M3.9ZS10		1N4728	DZ						3.9	64	10	1.0W
1M4.3ZS10		1N4728	DZ						4.3	58	10	1.0W
1M4.7ZS10		1N4728	DZ						4.7	53	10	1.0W
1M5.1ZS10		1N4728	DZ						5.1	49	10	1.0W
1M5.6ZS10		1N4728	DZ						5.6	45	10	1.0W
1M6.2ZS10		1N4728	DZ						6.2	41	10	1.0W
1M6.8ZS10		1N4728	DZ						6.8	37	10	1.0W
1M7.5ZS10		1N4728	DZ						7.5	34	10	1.0W



DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA μA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> @ Volts	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>ZT</sub> mA	Temp Range
1M8.2ZS10		1N4728	DZ						8.2	31	10	1.0W
1M9.1ZS10		1N4728	DZ						9.1	28	10	1.0W
1M10ZS10		1N4728	DZ						10	25	10	1.0W
1M11ZS10		1N4728	DZ						11	23	10	1.0W
1M12ZS10		1N4728	DZ						12	21	10	1.0W
1M13ZS10		1N4728	DZ						13	19	10	1.0W
1M15ZS10		1N4728	DZ						15	17	10	1.0W
1M16ZS10		1N4728	DZ						16	15.5	10	1.0W
1M18ZS10		1N4728	DZ						18	14	10	1.0W
1M20ZS10		1N4728	DZ						20	12.5	10	1.0W
1M22ZS10		1N4728	DZ						22	11.5	10	1.0W
1M24ZS10		1N4728	DZ						24	10.5	10	1.0W
1M27ZS10		1N4728	DZ						27	9.5	10	1.0W
1M30ZS10		1N4728	DZ						30	8.5	10	1.0W
1M33ZS10		1N4728	DZ						33	7.5	10	1.0W
1M36ZS10		1N4728	DZ						36	7.0	10	1.0W
1M39ZS10		1N4728	DZ						39	6.5	10	1.0W
1M43ZS10		1N4728	DZ						43	6.0	10	1.0W
1M47ZS10		1N4728	DZ						47	5.5	10	1.0W
1M51ZS10		1N4728	DZ						51	5.0	10	1.0W
1M56ZS10		1N4728	DZ						56	4.5	10	1.0W
1M62ZS10		1N4728	DZ						62	4.0	10	1.0W
1M68ZS10		1N4728	DZ						68	3.7	10	1.0W
1M75ZS10		1N4728	DZ						75	3.3	10	1.0W
1M82ZS10		1N4728	DZ						82	3.0	10	1.0W
1M91ZS10		1N4728	DZ						91	2.8	10	1.0W
1M100ZS10		1N4728	DZ						100	2.5	10	1.0W
1M110ZS10		1N4728	DZ						110	2.3	10	1.0W
1M120ZS10		1N4728	DZ						120	2.0	10	1.0W
1M130ZS10		1N4728	DZ						130	1.9	10	1.0W
1M150ZS10		1N4728	DZ						150	1.7	10	1.0W
1M160ZS10		1N4728	DZ						160	1.6	10	1.0W
1M180ZS10		1N4728	DZ						180	1.4	10	1.0W
1M200ZS10		1N4728	DZ						200	1.2	10	1.0W
MPZ5-16A	S	MPZ5-16	DZ						14	400		350W
MPZ5-16B	S	MPZ5-16	DZ						14	400		350W
MPZ5-32A	S	MPZ5-16	DZ						28	400		350W
MPZ5-32B	S	MPZ5-16	DZ						28	400		350W
MPZ5-32C	S	MPZ5-16	DZ						28	400		350W
MPZ5-180A	S	MPZ5-16	DZ						165	400		350W
MPZ5-180B	S	MPZ5-16	DZ						165	400		350W
MPZ5-180C	S	MPZ5-16	DZ						165	400		350W
MR501	S	MR501	R	100	1.0	3.0	5.0*	100				
MR502	S	MR501	R	200	1.0	3.0	5.0*	100				
MR504	S	MR501	R	400	1.0	3.0	5.0*	100				
MR506	S	MR501	R	600	1.0	3.0	5.0*	100				
MR508	S	MR501	R	800	1.0	3.0	5.0*	100				
MR510	S	MR501	R	1000	1.0	3.0	5.0*	100				
MR810	S	MR810	.R	50	1.1	1.0	0.01	30				
MR811	S	MR810	.R	100	1.1	1.0	0.01	30				
MR812	S	MR810	.R	200	1.1	1.0	0.01	30				
MR813	S	MR810	.R	300	1.1	1.0	0.01	30				
MR814	S	MR810	.R	400	1.1	1.0	0.01	30				
MR816	S	MR810	.R	500	1.1	1.0	0.01	30				
MR817	S	MR810	.R	800	1.1	1.0	0.01	30				
MR818	S	MR810	.R	1000	1.1	1.0	0.01	30				
MR820	S	MR820	.R	50	1.0	5.0	0.25	300				
MR821	S	MR820	.R	100	1.0	5.0	0.25	300				
MR822	S	MR820	.R	200	1.0	5.0	0.25	300				
MR824	S	MR820	.R	400	1.0	5.0	0.25	300				
MR826	S	MR820	.R	600	1.0	5.0	0.25	300				

.R t<sub>rr</sub> 200 ns  
MR810 series 750 ns



# DIODE, RECTIFIER INDEX (continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> @ Volts	I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>zt</sub> mA	Temp Range
MR830	S	MR830	.R	50	1.1	3.0	0.05	100				
MR831	S	MR830	.R	100	1.1	3.0	0.05	100				
MR832	S	MR830	.R	200	1.1	3.0	0.05	100				
MR834	S	MR830	.R	400	1.1	3.0	0.05	100				
MR836	S	MR830	.R	600	1.1	3.0	0.05	100				
MR840	S	MR830	.R	50	1.2	3.0	0.075	100				
MR841	S	MR830	.R	100	1.2	3.0	0.075	100				
MR842	S	MR830	.R	200	1.2	3.0	0.075	100				
MR844	S	MR830	.R	400	1.2	3.0	0.075	100				
MR846	S	MR830	.R	600	1.2	3.0	0.075	100				
MR850	S	MR850	.R	50	1.25	3.0	0.01	100				
MR851	S	MR850	.R	100	1.25	3.0	0.01	100				
MR852	S	MR850	.R	200	1.25	3.0	0.01	100				
MR854	S	MR850	.R	400	1.25	3.0	0.01	100				
MR856	S	MR850	.R	600	1.25	3.0	0.01	100				
MR860	S	MR860	.R	50	1.4	40	0.05	350				
MR861	S	MR860	.R	100	1.4	40	0.05	350				
MR862	S	MR860	.R	200	1.4	40	0.05	350				
MR864	S	MR860	.R	400	1.4	40	0.05	350				
MR866	S	MR860	.R	600	1.4	40	0.05	350				
MR870	S	MR870	.R	50	1.4	50	0.05	400				
MR871	S	MR870	.R	100	1.4	50	0.05	400				
MR872	S	MR870	.R	200	1.4	50	0.05	400				
MR874	S	MR870	.R	400	1.4	50	0.05	400				
MR876	S	MR870	.R	600	1.4	50	0.05	400				
MR990A	S	MR990A	R	1000	1.7	0.25	0.1	15				
MR991A	S	MR990A	R	1500	1.7	0.25	0.1	15				
MR992A	S	MR990A	R	2000	1.7	0.25	0.1	15				
MR993A	S	MR990A	R	2500	1.7	0.25	0.1	15				
MR994A	S	MR990A	R	3000	1.7	0.25	0.1	15				
MR995A	S	MR990A	R	4000	1.7	0.25	0.1	15				
MR996A	S	MR990A	R	5000	1.7	0.25	0.1	15				
MR1120	S	MR1120	R	50	1.0	12	0.5	300				
MR1121	S	MR1120	R	100	1.0	12	0.5	300				
MR1122	S	MR1120	R	200	0.55	12	0.5	300				
MR1123	S	MR1120	R	300	0.55	12	0.5	300				
MR1124	S	MR1120	R	400	0.55	12	0.5	300				
MR1125	S	MR1120	R	500	0.55	12	0.5	300				
MR1126	S	MR1120	R	600	0.55	12	0.5	300				
MR1128	S	MR1120	R	800	0.55	12	0.5	300				
MR1130	S	MR1120	R	1000	0.55	12	0.5	300				
MR1200	S	MR1200	R	50	0.4	50	10	500				
MR1201	S	MR1200	R	100	0.4	50	10	500				
MR1202	S	MR1200	R	150	0.4	50	10	500				
MR1203	S	MR1200	R	200	0.4	50	10	500				
MR1204	S	MR1200	R	250	0.4	50	10	500				
MR1205	S	MR1200	R	300	0.4	50	10	500				
MR1206	S	MR1200	R	350	0.4	50	10	500				
MR1207	S	MR1200	R	400	0.4	50	10	500				
MR1210	S	MR1210	R	50	0.4	80	15	2000				
MR1211	S	MR1210	R	100	0.4	80	15	2000				
MR1212	S	MR1210	R	150	0.4	80	15	2000				
MR1213	S	MR1210	R	200	0.4	80	15	2000				
MR1214	S	MR1210	R	250	0.4	80	15	2000				
MR1215	S	MR1210	R	300	0.4	80	15	2000				

.R t<sub>rr</sub> 200 ns  
MR840 series 1000 ns



DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> mA	I <sub>R</sub> mA	I <sub>FSM</sub> mA	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> %	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>zt</sub> mA	Temp Range
MR1216	S	MR1210	R	350	0.4	80	15	2000				
MR1217	S	MR1210	R	400	0.4	80	15	2000				
MR1218	S	MR1210	R	500	0.4	80	15	2000				
MR1219	S	MR1210	R	600	0.4	80	15	2000				
MR1220	S	MR1220	R	50	0.4	160	20	3600				
MR1221	S	MR1220	R	100	0.4	160	20	3600				
MR1222	S	MR1220	R	150	0.4	160	20	3600				
MR1223	S	MR1220	R	200	0.4	160	20	3600				
MR1224	S	MR1220	R	250	0.4	160	20	3600				
MR1225	S	MR1220	R	300	0.4	160	20	3600				
MR1226	S	MR1220	R	350	0.4	160	20	3600				
MR1227	S	MR1220	R	400	0.4	160	20	3600				
MR1230	S	MR1230	R	50	0.4	240	35	5000				
MR1231	S	MR1230	R	100	0.4	240	35	5000				
MR1232	S	MR1230	R	150	0.4	240	35	5000				
MR1233	S	MR1230	R	200	0.4	240	35	5000				
MR1234	S	MR1230	R	250	0.4	240	35	5000				
MR1235	S	MR1230	R	300	0.4	240	35	5000				
MR1236	S	MR1230	R	350	0.4	240	35	5000				
MR1237	S	MR1230	R	400	0.4	240	35	5000				
MR1240	S	MR1240	R	50	0.4	400	50	8000				
MR1241	S	MR1240	R	100	0.4	400	50	8000				
MR1242	S	MR1240	R	150	0.4	400	50	8000				
MR1243	S	MR1240	R	200	0.4	400	50	8000				
MR1244	S	MR1240	R	250	0.4	400	50	8000				
MR1245	S	MR1240	R	300	0.4	400	50	8000				
MR1246	S	MR1240	R	350	0.4	400	50	8000				
MR1247	S	MR1240	R	400	0.4	400	50	8000				
MR1260	S	MR1260	R	50	0.4	650	100	12,000				
MR1261	S	MR1260	R	100	0.4	650	100	12,000				
MR1262	S	MR1260	R	150	0.4	650	100	12,000				
MR1263	S	MR1260	R	200	0.4	650	100	12,000				
MR1264	S	MR1260	R	250	0.4	650	100	12,000				
MR1265	S	MR1260	R	300	0.4	650	100	12,000				
MR1266	S	MR1260	R	350	0.4	650	100	12,000				
MR1267	S	MR1260	R	400	0.4	650	100	12,000				
MR1290	S	MR1290	R	50	0.4	1000	200	18,000				
MR1291	S	MR1290	R	100	0.4	1000	200	18,000				
MR1292	S	MR1290	R	150	0.4	1000	200	18,000				
MR1293	S	MR1290	R	200	0.4	1000	200	18,000				
MR1294	S	MR1290	R	250	0.4	1000	200	18,000				
MR1295	S	MR1290	R	300	0.4	1000	200	18,000				
MR1296	S	MR1290	R	350	0.4	1000	200	18,000				
MR1297	S	MR1290	R	400	0.4	1000	200	18,000				
MR1337-1	S	MR1337	.R	50	1.1	1000	0.25	30				
MR1337-2	S	MR1337	.R	100	1.1	1000	0.25	30				
MR1337-3	S	MR1337	.R	200	1.1	1000	0.25	30				
MR1337-4	S	MR1337	.R	300	1.1	1000	0.25	30				
MR1337-5	S	MR1337	.R	400	1.1	1000	0.25	30				
MR1366	S	1N4933	.R	600	1.2	6.0	0.015	150				
MR1376	S	1N4933	.R	600	1.4	12	0.015	200				
MR1386	S	1N4933	.R	600	1.4	20	0.025	250				
MR1396	S	1N4933	.R	600	1.4	30	0.025	300				
MR1810	S	MR1210	R	50	0.4	80	15	2000				
MR1811	S	MR1210	R	100	0.4	80	15	2000				
MR1812	S	MR1210	R	150	0.4	80	15	2000				
MR1813	S	MR1210	R	200	0.4	80	15	2000				
MR1814	S	MR1210	R	250	0.4	80	15	2000				
MR1815	S	MR1210	R	300	0.4	80	15	2000				



# DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	I <sub>F</sub> mA	I <sub>R</sub> mA	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>ZT</sub> mA	Temp Range
MR1816	S	MR1210	R	350	0.4	80	15	2000				
MR1817	S	MR1210	R	400	0.4	80	15	2000				
MR1818	S	MR1210	R	500	0.4	80	15	2000				
MR1819	S	MR1210	R	600	0.4	80	15	2000				
MR2064	S	MR2064	R	50	1.2	1.0	25	30				
MR2065	S	MR2064	R	100	1.2	1.0	25	30				
MR2066	S	MR2064	R	200	1.2	1.0	25	30				
MR2067	S	MR2064	R	400	1.2	1.0	25	30				
MR2068	S	MR2064	R	600	1.2	1.0	25	30				
MR2069	S	MR2069	R	50								
MR2070	S	MR2069	R	100	0.5	3.0	1.0	300				
MR2071	S	MR2069	R	200	0.5	3.0	1.0	300				
MR2072	S	MR2069	R	300	0.5	3.0	1.0	300				
MR2073	S	MR2069	R	400	0.5	3.0	1.0	300				
MR2074	S	MR2069	R	500	0.5	3.0	1.0	300				
MR2075	S	MR2069	R	600	0.5	3.0	1.0	300				
MR2080HA	S	MR2084HA	R	50	0.5	750	4.0	12,000				
MR2081HA	S	MR2084HA	R	100	0.5	750	4.0	12,000				
MR2082HA	S	MR2084HA	R	200	0.5	750	4.0	12,000				
MR2083HA	S	MR2084HA	R	300	0.5	750	4.0	12,000				
MR2084HA	S	MR2084HA	R	400	0.5	750	4.0	12,000				
MR2100HA	S	MR2100HA	R	50	0.5	1100	5.0	18,000				
MR2101HA	S	MR2100HA	R	100	0.5	1100	5.0	18,000				
MR2102HA	S	MR2100HA	R	200	0.5	1100	5.0	18,000				
MR2103HA	S	MR2100HA	R	300	0.5	1100	5.0	18,000				
MR2104HA	S	MR2100HA	R	400	0.5	1100	5.0	18,000				
MR2261	S	MR2261	R	10	1.5	25	1.0	300				
MR2262	S	MR2261	R	20	1.5	25	1.0	300				
MR2263	S	MR2261	R	30	1.5	25	1.0	300				
MR2264	S	MR2261	R	40	1.5	25	1.0	300				
MR2265	S	MR2261	R	50	1.5	25	1.0	300				
MR2266	S	MR2261	R	800	1.1	1.0	0.01	30				
MR2271	S	MR2271	R	300	1.1	1.0	0.025	30				
MR2272	S	MR2272	R	400	1.1	1.0	0.01	30				
MR2273	S	MR2266	R	200	1.1	1.0	0.01	30				
MR2369	S	MR2369	R	50	1.0	3.0	1.0	300				
MR2370	S	MR2369	R	100	1.0	3.0	1.0	300				
MR2371	S	MR2369	R	200	1.0	3.0	1.0	300				
MR2372	S	MR2369	R	300	1.0	3.0	1.0	300				
MR2373	S	MR2369	R	400	1.0	3.0	1.0	300				
MR2374	S	MR2369	R	500	1.0	3.0	1.0	300				
MR2375	S	MR2369	R	600	1.0	3.0	1.0	300				
MR5005	S	MR5005	R	50	1.18	50	0.2	600				
MR5010	S	MR5005	R	100	1.18	50	0.2	600				
MR5020	S	MR5005	R	200	1.18	50	0.2	600				
MR5030	S	MR5005	R	300	1.18	50	0.2	600				
MR5040	S	MR5005	R	400	1.18	50	0.2	600				
MR9600	S	MR9600	R	25	1.3	0.8	0.5	15				
MR9601	S	MR9600	R	50	1.3	0.8	0.5	15				
MR9602	S	MR9600	R	100	1.3	0.8	0.5	15				
MR9603	S	MR9600	R	200	1.3	0.8	0.5	15				
MR9604	S	MR9600	R	400	1.3	0.8	0.5	15				
MRA130	S	MRA130	R	50	0.5	150	1.5	3000				
MRA131	S	MRA130	R	100	0.5	150	1.5	3000				
MRA132	S	MRA130	R	200	0.5	150	1.5	3000				
MRA133	S	MRA130	R	300	0.5	150	1.5	3000				
MRA134	S	MRA130	R	400	0.5	150	1.5	3000				
MRA160	S	MRA160	R	50	0.5	300	3.0	6000				
MRA161	S	MRA160	R	100	0.5	300	3.0	6000				
MRA162	S	MRA160	R	200	0.5	300	3.0	6000				
MRA163	S	MRA160	R	300	0.5	300	3.0	6000				
MRA164	S	MRA160	R	400	0.5	300	3.0	6000				
MRA330	S	MRA330	R	50	0.5	100	1.0	2000				
MRA331	S	MRA330	R	100	0.5	100	1.0	2000				
MRA332	S	MRA330	R	200	0.5	100	1.0	2000				



DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom) *Typ	TC %/°C	I <sub>zt</sub> mA	Temp Range
MRA333	S	MRA330	R	300	0.5	100	1.0	2000				
MRA334	S	MRA330	R	400	0.5	100	1.0	2000				
MRA360	S	MRA360	R	50	0.5	220	3.0	5000				
MRA361	S	MRA360	R	100	0.5	220	3.0	5000				
MRA362	S	MRA360	R	200	0.5	220	3.0	5000				
MRA363	S	MRA360	R	300	0.5	220	3.0	5000				
MRA364	S	MRA360	R	400	0.5	220	3.0	5000				
MSD6100	S	MSD6100	R	100	0.7	200	5.0	500				
MSD6101	S	MSD6101	R	50	0.57	200	0.1	500				
MSD6102	S	MSD6102	R	70	1.0	200	0.1	500				
MSD6150	S	MSD6150	R	70	1.0	200	0.1	500				
MSD7000	S	MSD7000	R	100	0.55			500				
MVS460	S	MVS460	DR						33*		18	



# DIODE, RECTIFIER INDEX (continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>zt</sub> mA	Temp Range
MZ500-1	S	MZ500-1	DZ						2.4	20		400M
MZ500-2	S	MZ500-1	DZ						2.7	20		400M
MZ500-3	S	MZ500-1	DZ						3.0	20		400M
MZ500-4	S	MZ500-1	DZ						3.3	20		400M
MZ500-5	S	MZ500-1	DZ						3.6	20		400M
MZ500-6	S	MZ500-1	DZ						3.9	20		400M
MZ500-7	S	MZ500-1	DZ						4.3	20		400M
MZ500-8	S	MZ500-1	DZ						4.7	20		400M
MZ500-9	S	MZ500-1	DZ						5.1	20		400M
MZ500-10	S	MZ500-1	DZ						5.6	20		400M
MZ500-11	S	MZ500-1	DZ						6.2	20		400M
MZ500-12	S	MZ500-1	DZ						6.8	20		400M
MZ500-13	S	MZ500-1	DZ						7.5	20		400M
MZ500-14	S	MZ500-1	DZ						8.2	20		400M
MZ500-15	S	MZ500-1	DZ						9.1	20		400M
MZ500-16	S	MZ500-1	DZ						10	20		400M
MZ500-17	S	MZ500-1	DZ						11	20		400M
MZ500-18	S	MZ500-1	DZ						12	20		400M
MZ500-19	S	MZ500-1	DZ						13	9.5		400M
MZ500-20	S	MZ500-1	DZ						15	8.5		400M
MZ500-21	S	MZ500-1	DZ						16	7.8		400M
MZ500-22	S	MZ500-1	DZ						18	7.0		400M
MZ500-23	S	MZ500-1	DZ						20	6.2		400M
MZ500-24	S	MZ500-1	DZ						22	5.6		400M
MZ500-25	S	MZ500-1	DZ						24	5.2		400M
MZ500-26	S	MZ500-1	DZ						27	4.6		400M
MZ500-27	S	MZ500-1	DZ						30	4.2		400M
MZ500-28	S	MZ500-1	DZ						33	3.8		400M
MZ500-29	S	MZ500-1	DZ						36	3.4		400M
MZ500-30	S	MZ500-1	DZ						39	3.2		400M
MZ500-31	S	MZ500-1	DZ						43	3.0		400M
MZ500-32	S	MZ500-1	DZ						47	2.7		400M
MZ500-33	S	MZ500-1	DZ						51	2.5		400M
MZ500-34	S	MZ500-1	DZ						56	2.2		400M
MZ500-35	S	MZ500-1	DZ						62	2.0		400M
MZ500-36	S	MZ500-1	DZ						68	1.8		400M
MZ500-37	S	MZ500-1	DZ						75	1.7		400M
MZ500-38	S	MZ500-1	DZ						82	1.5		400M
MZ500-39	S	MZ500-1	DZ						91	1.4		400M
MZ500-40	S	MZ500-1	DZ						100	1.3		400M
MZ1000-1	S	MZ1000-1	DZ						3.3	76		1.5W
MZ1000-2	S	MZ1000-1	DZ						3.6	69		1.5W
MZ1000-3	S	MZ1000-1	DZ						3.9	64		1.5W
MZ1000-4	S	MZ1000-1	DZ						4.3	58		1.5W
MZ1000-5	S	MZ1000-1	DZ						4.7	53		1.5W
MZ1000-6	S	MZ1000-1	DZ						5.1	49		1.5W
MZ1000-7	S	MZ1000-1	DZ						5.6	45		1.5W



DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>ZT</sub> mA	Temp Range
MZ1000-8	S	MZ1000-1	DZ						6.2	41		1.5W
MZ1000-9	S	MZ1000-1	DZ						6.8	37		1.5W
MZ1000-10	S	MZ1000-1	DZ						7.5	34		1.5W
MZ1000-11	S	MZ1000-1	DZ						8.2	31		1.5W
MZ1000-12	S	MZ1000-1	DZ						9.1	28		1.5W
MZ1000-13	S	MZ1000-1	DZ						10	25		1.5W
MZ1000-14	S	MZ1000-1	DZ						11	23		1.5W
MZ1000-15	S	MZ1000-1	DZ						12	21		1.5W
MZ1000-16	S	MZ1000-1	DZ						13	19		1.5W
MZ1000-17	S	MZ1000-1	DZ						15	17		1.5W
MZ1000-18	S	MZ1000-1	DZ						16	15.5		1.5W
MZ1000-19	S	MZ1000-1	DZ						18	14		1.5W
MZ1000-20	S	MZ1000-1	DZ						20	12.5		1.5W
MZ1000-21	S	MZ1000-1	DZ						22	11.5		1.5W
MZ1000-22	S	MZ1000-1	DZ						24	10.5		1.5W
MZ1000-23	S	MZ1000-1	DZ						27	9.5		1.5W
MZ1000-24	S	MZ1000-1	DZ						30	8.5		1.5W
MZ1000-25	S	MZ1000-1	DZ						33	7.5		1.5W
MZ1000-26	S	MZ1000-1	DZ						36	7.0		1.5W
MZ1000-27	S	MZ1000-1	DZ						39	6.5		1.5W
MZ1000-28	S	MZ1000-1	DZ						43	6.0		1.5W
MZ1000-29	S	MZ1000-1	DZ						47	5.5		1.5W
MZ1000-30	S	MZ1000-1	DZ						51	5.0		1.5W
MZ1000-31	S	MZ1000-1	DZ						56	4.5		1.5W
MZ1000-32	S	MZ1000-1	DZ						62	4.0		1.5W
MZ1000-33	S	MZ1000-1	DZ						68	3.7		1.5W
MZ1000-34	S	MZ1000-1	DZ						75	3.3		1.5W
MZ1000-35	S	MZ1000-1	DZ						82	3.0		1.5W
MZ1000-36	S	MZ1000-1	DZ						91	2.8		1.5W
MZ1000-37	S	MZ1000-1	DZ						100	2.5		1.5W
MZ4614	S	1N4099	DZ						1.8	0.25	5.0	250M
MZ4615	S	1N4099	DZ						2.0	0.25	5.0	250M
MZ4616	S	1N4099	DZ						2.2	0.25	5.0	250M
MZ4617	S	1N4099	DZ						2.4	0.25	5.0	250M
MZ4618	S	1N4099	DZ						2.7	0.25	5.0	250M
MZ4619	S	1N4099	DZ						3.0	0.25	5.0	250M
MZ4620	S	1N4099	DZ						3.3	0.25	5.0	250M
MZ4621	S	1N4099	DZ						3.6	0.25	5.0	250M
MZ4622	S	1N4099	DZ						3.9	0.25	5.0	250M
MZ4623	S	1N4099	DZ						4.3	0.25	5.0	250M
MZ4624	S	1N4099	DZ						4.7	0.25	5.0	250M
MZ4625	S	1N4099	DZ						5.1	0.25	5.0	250M
MZ4626	S	1N4099	DZ						5.6	0.25	5.0	250M
MZ4627	S	1N4099	DZ						6.2	0.25	5.0	250M
MZC2.4A10	S	MZC2.4A10	DZ						2.4	21	10	5.0W
MZC2.5A10	S	MZC2.4A10	DZ						2.5	20	10	5.0W
MZC2.7A10	S	MZC2.4A10	DZ						2.7	19	10	5.0W
MZC2.8A10	S	MZC2.4A10	DZ						2.8	18	10	5.0W
MZC3.0A10	S	MZC2.4A10	DZ						3.0	17	10	5.0W
MZC3.3A10	S	MZC2.4A10	DZ						3.3	15	10	5.0W
MZC3.6A10	S	MZC2.4A10	DZ						3.6	14	10	5.0W
MZC3.9A10	S	MZC2.4A10	DZ						3.9	13	10	5.0W
MZC4.3A10	S	MZC2.4A10	DZ						4.3	12	10	5.0W
MZC4.7A10	S	MZC2.4A10	DZ						4.7	11	10	5.0W
MZC5.1A10	S	MZC2.4A10	DZ						5.1	9.8	10	5.0W
MZC5.6A10	S	MZC2.4A10	DZ						5.6	8.9	10	5.0W
MZC6.0A10	S	MZC2.4A10	DZ						6.0	8.3	10	5.0W
MZC6.2A10	S	MZC2.4A10	DZ						6.2	8.1	10	5.0W
MZC6.8A10	S	MZC2.4A10	DZ						6.8	7.3	10	5.0W
MZC7.5A10	S	MZC2.4A10	DZ						7.5	6.7	10	5.0W

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# DIODE, RECTIFIER INDEX(continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>ZT</sub> mA	Temp Range
MZC8.2A10	S	MZC2.4A10	DZ						8.2	6.1	10	5.0W
MZC8.7A10	S	MZC2.4A10	DZ						8.7	5.7	10	5.0W
MZC9.1A10	S	MZC2.4A10	DZ						9.1	5.5	10	5.0W
MZC10A10	S	MZC2.4A10	DZ						10	5.0	10	5.0W
MZC11A10	S	MZC2.4A10	DZ						11	4.5	10	5.0W
MZC12A10	S	MZC2.4A10	DZ						12	4.2	10	5.0W
MZC13A10	S	MZC2.4A10	DZ						13	3.8	10	5.0W
MZC14A10	S	MZC2.4A10	DZ						14	3.6	10	5.0W
MZC15A10	S	MZC2.4A10	DZ						15	3.1	10	5.0W
MZC16A10	S	MZC2.4A10	DZ						16	2.9	10	5.0W
MZC17A10	S	MZC2.4A10	DZ						17	2.8	10	5.0W
MZC18A10	S	MZC2.4A10	DZ						18	2.6	10	5.0W
MZC19A10	S	MZC2.4A10	DZ						19	2.5	10	5.0W
MZC20A10	S	MZC2.4A10	DZ						20	2.3	10	5.0W
MZC22A10	S	MZC2.4A10	DZ						22	2.1	10	5.0W
MZC24A10	S	MZC2.4A10	DZ						24	2.0	10	5.0W
MZC25A10	S	MZC2.4A10	DZ						25	1.9	10	5.0W
MZC27A10	S	MZC2.4A10	DZ						27	1.8	10	5.0W
MZC28A10	S	MZC2.4A10	DZ						28		10	5.0W
MZC30A10	S	MZC2.4A10	DZ						30	1.7	10	5.0W
MZC33A10	S	MZC2.4A10	DZ						33	1.5	10	5.0W
MZC36A10	S	MZC2.4A10	DZ						36	1.4	10	5.0W
MZC39A10	S	MZC2.4A10	DZ						39	1.3	10	5.0W
MZC43A10	S	MZC2.4A10	DZ						43	1.2	10	5.0W
MZC47A10	S	MZC2.4A10	DZ						47	1.1	10	5.0W
MZC51A10	S	MZC2.4A10	DZ						51	0.98	10	5.0W
MZC56A10	S	MZC2.4A10	DZ						56	0.89	10	5.0W
MZC60A10	S	MZC2.4A10	DZ						60	0.83	10	5.0W
MZC62A10	S	MZC2.4A10	DZ						62	0.81	10	5.0W
MZC68A10	S	MZC2.4A10	DZ						68	0.74	10	5.0W
MZC75A10	S	MZC2.4A10	DZ						75	0.67	10	5.0W
MZC82A10	S	MZC2.4A10	DZ						82	0.61	10	5.0W
MZC87A10	S	MZC2.4A10	DZ						87	0.57	10	5.0W
MZC91A10	S	MZC2.4A10	DZ						91	0.55	10	5.0W
MZC100A10	S	MZC2.4A10	DZ						100	0.50	10	5.0W
MZC110A10	S	MZC2.4A10	DZ						110	0.45	10	5.0W
MZC120A10	S	MZC2.4A10	DZ						120	0.42	10	5.0W
MZC130A10	S	MZC2.4A10	DZ						130	0.38	10	5.0W
MZC140A10	S	MZC2.4A10	DZ						140	0.36	10	5.0W
MZC150A10	S	MZC2.4A10	DZ						150	0.33	10	5.0W
MZC160A10	S	MZC2.4A10	DZ						160	0.31	10	5.0W
MZC170A10	S	MZC2.4A10	DZ						170	0.29	10	5.0W
MZC180A10	S	MZC2.4A10	DZ						180	0.28	10	5.0W
MZC190A10	S	MZC2.4A10	DZ						190	0.26	10	5.0W
MZC200A10	S	MZC2.4A10	DZ						200	0.25	10	5.0W
MZC1.8B10	S	MZC2.4A10	DZ						1.8		10	5.0W
MZC2.0B10	S	MZC2.4A10	DZ						2.0		10	5.0W
MZC2.2B10	S	MZC2.4A10	DZ						2.2		10	5.0W
MZC2.4B10	S	MZC2.4A10	DZ						2.4		10	5.0W
MZC2.7B10	S	MZC2.4A10	DZ						2.7		10	5.0W
MZC3.0B10	S	MZC2.4A10	DZ						3.0		10	5.0W
MZC3.3B10	S	MZC2.4A10	DZ						3.3		10	5.0W
MZC3.6B10	S	MZC2.4A10	DZ						3.6		10	5.0W
MZC3.9B10	S	MZC2.4A10	DZ						3.9		10	5.0W
MZC4.3B10	S	MZC2.4A10	DZ						4.3		10	5.0W
MZC4.7B10	S	MZC2.4A10	DZ						4.7		10	5.0W
MZC5.1B10	S	MZC2.4A10	DZ						5.1		10	5.0W
MZC5.6B10	S	MZC2.4A10	DZ						5.6		10	5.0W
MZC6.2B10	S	MZC2.4A10	DZ						6.2		10	5.0W
MZC6.8B10	S	MZC2.4A10	DZ						6.8		10	5.0W



DIODE, RECTIFIER INDEX (continued)

Type	MATERIAL	Ref.	IDENTIFICATION	RECTIFIERS					ZENER DIODES			
				V <sub>R</sub> Volts	V <sub>F</sub> Volts	I <sub>O</sub> Amp	I <sub>R</sub> mA	I <sub>FSM</sub> Amp	V <sub>Z</sub> (Nom)	I <sub>ZT</sub> mA	Tol V <sub>Z</sub> ±%	P <sub>D</sub>
				SIGNAL DIODES					REFERENCE DIODES			
				PRV Volts	V <sub>F</sub> Volts	@ I <sub>F</sub>	I <sub>R</sub>	t <sub>rr</sub> μs	V <sub>Z</sub> (Nom)	TC %/°C	I <sub>zt</sub> mA	Temp Range
MZC7.5B10	S	MZC2.4A10	DZ						7.5		10	5.0W
MZC8.2B10	S	MZC2.4A10	DZ						8.2		10	5.0W
MZC8.7B10	S	MZC2.4A10	DZ						8.7		10	5.0W
MZC9.1B10	S	MZC2.4A10	DZ						9.1		10	5.0W
MZC10B10	S	MZC2.4A10	DZ						10		10	5.0W
MZC11B10	S	MZC2.4A10	DZ						11		10	5.0W
MZC12B10	S	MZC2.4A10	DZ						12		10	5.0W
MZC13B10	S	MZC2.4A10	DZ						13		10	5.0W
MZC14B10	S	MZC2.4A10	DZ						14		10	5.0W
MZC15B10	S	MZC2.4A10	DZ						15		10	5.0W
MZC16B10	S	MZC2.4A10	DZ						16		10	5.0W
MZC17B10	S	MZC2.4A10	DZ						17		10	5.0W
MZC18B10	S	MZC2.4A10	DZ						18		10	5.0W
MZC19B10	S	MZC2.4A10	DZ						19		10	5.0W
MZC20B10	S	MZC2.4A10	DZ						20		10	5.0W
MZC22B10	S	MZC2.4A10	DZ						22		10	5.0W
MZC24B10	S	MZC2.4A10	DZ						24		10	5.0W
MZC25B10	S	MZC2.4A10	DZ						25		10	5.0W
MZC27B10	S	MZC2.4A10	DZ						27		10	5.0W
MZC28B10	S	MZC2.4A10	DZ						28		10	5.0W
MZC30B10	S	MZC2.4A10	DZ						30		10	5.0W
MZC33B10	S	MZC2.4A10	DZ						33		10	5.0W
MZC36B10	S	MZC2.4A10	DZ						36		10	5.0W
MZC39B10	S	MZC2.4A10	DZ						39		10	5.0W
MZC43B10	S	MZC2.4A10	DZ						43		10	5.0W
MZC47B10	S	MZC2.4A10	DZ						47		10	5.0W
MZC51B10	S	MZC2.4A10	DZ						51		10	5.0W
MZC56B10	S	MZC2.4A10	DZ						56		10	5.0W
MZC60B10	S	MZC2.4A10	DZ						60		10	5.0W
MZC62B10	S	MZC2.4A10	DZ						62		10	5.0W
MZC68B10	S	MZC2.4A10	DZ						68		10	5.0W
MZC75B10	S	MZC2.4A10	DZ						75		10	5.0W
MZC82B10	S	MZC2.4A10	DZ						82		10	5.0W
MZC87B10	S	MZC2.4A10	DZ						87		10	5.0W
MZC91B10	S	MZC2.4A10	DZ						91		10	5.0W
MZC100B10	S	MZC2.4A10	DZ						100		10	5.0W
MZC110B10	S	MZC2.4A10	DZ						110		10	5.0W
MZC120B10	S	MZC2.4A10	DZ						120		10	5.0W
MZC130B10	S	MZC2.4A10	DZ						130		10	5.0W
MZC140B10	S	MZC2.4A10	DZ						140		10	5.0W
MZC150B10	S	MZC2.4A10	DZ						150		10	5.0W
MZC160B10	S	MZC2.4A10	DZ						160		10	5.0W
MZC170B10	S	MZC2.4A10	DZ						170		10	5.0W
MZC180B10	S	MZC2.4A10	DZ						180		10	5.0W
MZC190B10	S	MZC2.4A10	DZ						190		10	5.0W
MZC200B10	S	MZC2.4A10	DZ						200		10	5.0W







RECTIFIER ASSEMBLIES

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered rectifier assemblies.

KEY

Type	Material	Ref.	VRRM Volts	IFSM Amp	IFRM Amp	IO Amp @ °C
Alpha-numerical Listings						
S – Silicon G – Germanium						
Reference Device number indicates specific data sheet on which device is characterized						
Peak Reverse Voltage						
Peak Surge Current						
Peak Forward Current						
DC Output Current Amp @ °C						



# RECTIFIER ASSEMBLIES

Type	Material	Ref.	V <sub>RRM</sub> Volts	I <sub>FSM</sub> Amp	I <sub>FRM</sub> Amp	I <sub>o</sub> Amp @	°C
MDA920-1	S	MDA920	25	32	5.0	1.0	75
MDA920-2	S	MDA920	50	32	5.0	1.0	75
MDA920-3	S	MDA920	100	32	5.0	1.0	75
MDA920-4	S	MDA920	200	32	5.0	1.0	75
MDA920-5	S	MDA920	300	32	5.0	1.0	75
MDA920-6	S	MDA920	400	32	5.0	1.0	75
MDA920-7	S	MDA920	600	32	5.0	1.0	75
MDA922-1	S	MDA922-1	25	60		1.8	55
MDA922-2	S	MDA922-1	50	60		1.8	55
MDA922-3	S	MDA922-1	100	60		1.8	55
MDA922-4	S	MDA922-1	200	60		1.8	55
MDA922-5	S	MDA922-1	300	60		1.8	55
MDA922-6	S	MDA922-1	400	60		1.8	55
MDA922-7	S	MDA922-1	600	60		1.8	55
MDA922-8	S	MDA922-1	800	60		1.8	55
MDA922-9	S	MDA922-1	1000	60		1.8	55
MDA930-1	S	MDA920	25	32	5.0	0.5	75
MDA930-2	S	MDA920	50	32	5.0	0.5	75
MDA930-3	S	MDA920	100	32	5.0	0.5	75
MDA930-4	S	MDA920	200	32	5.0	0.5	75
MDA930-5	S	MDA920	300	32	5.0	0.5	75
MDA930-6	S	MDA920	400	32	5.0	0.5	75
MDA930-7	S	MDA920	600	32	5.0	0.5	75
MDA940-1	S	MDA920	25	32	5.0	1.0	75
MDA940-2	S	MDA920	50	32	5.0	1.0	75
MDA940-3	S	MDA920	100	32	5.0	1.0	75
MDA940-4	S	MDA920	200	32	5.0	1.0	75
MDA940-5	S	MDA920	300	32	5.0	1.0	75
MDA940-6	S	MDA920	400	32	5.0	1.0	75
MDA940-7	S	MDA920	600	32	5.0	1.0	75
MDA942-1	S	MDA942	50	25	6.0	1.5	55
MDA942-2	S	MDA942	100	25	6.0	1.5	55
MDA942-3	S	MDA942	200	25	6.0	1.5	55
MDA942-4	S	MDA942	300	25	6.0	1.5	55
MDA942-5	S	MDA942	400	25	6.0	1.5	55
MDA942-6	S	MDA942	600	25	6.0	1.5	55
MDA950-1	S	MDA920	25	32	5.0	1.0	75
MDA950-2	S	MDA920	50	32	5.0	1.0	75
MDA950-3	S	MDA920	100	32	5.0	1.0	75
MDA950-4	S	MDA920	200	32	5.0	1.0	75
MDA950-5	S	MDA920	300	32	5.0	1.0	75
MDA950-6	S	MDA920	400	32	5.0	1.0	75
MDA950-7	S	MDA920	600	32	5.0	1.0	75
MDA952-1	S	MDA942	50	150	35	6.0	55
MDA952-2	S	MDA942	100	150	35	6.0	55
MDA952-3	S	MDA942	200	150	35	6.0	55
MDA952-4	S	MDA942	300	150	35	6.0	55
MDA952-5	S	MDA942	400	150	35	6.0	55
MDA952-6	S	MDA942	600	150	35	6.0	55
MDA952FR-1	S	MDA952FR-1	50	150		6.0	55



RECTIFIER ASSEMBLIES (continued)

Type	Material	Ref.	V <sub>RRM</sub> Volts	I <sub>FSM</sub> Amp	I <sub>FRM</sub> Amp	I <sub>O</sub> Amp @	°C
MDA952FR-2	S	MDA952FR-1	100	150		6.0	55
MDA952FR-3	S	MDA952FR-1	200	150		6.0	55
MDA952FR-4	S	MDA952FR-1	300	150		6.0	55
MDA952FR-5	S	MDA952FR-1	400	150		6.0	55
MDA960-1	S	MDA960	50	100	15	2.5	55
MDA960-2	S	MDA960	100	100	15	2.5	55
MDA960-3	S	MDA960	200	100	15	2.5	55
MDA962-1	S	MDA960	50	250	60	10	55
MDA962-2	S	MDA942	100	250	60	10	55
MDA962-3	S	MDA942	200	250	60	10	55
MDA962-4	S	MDA942	300	250	60	10	55
MDA962-5	S	MDA942	400	250	60	10	55
MDA970-1	S	MDA960	50	150	25	4.0	55
MDA970-2	S	MDA960	100	150	25	4.0	55
MDA970-3	S	MDA960	200	150	25	4.0	55
MDA972-1	S	MDA942	35	250	60	16	55
MDA972-2	S	MDA942	70	250	60	16	55
MDA972-3	S	MDA942	140	250	60	16	55
MDA972-4	S	MDA942	210	250	60	16	55
MDA972-5	S	MDA942	280	250	60	16	55
MDA980-1	S	MDA980-1	50	300		12	55
MDA980-2	S	MDA980-1	100	300		12	55
MDA980-3	S	MDA980-1	200	300		12	55
MDA980-4	S	MDA980-1	300	300		12	55
MDA980-5	S	MDA980-1	400	300		12	55
MDA980-6	S	MDA980-1	600	300		12	55
MDA990-1	S	MDA980-1	50	300		27	55
MDA990-2	S	MDA980-1	100	300		27	55
MDA990-3	S	MDA980-1	200	300		27	55
MDA990-4	S	MDA980-1	300	300		27	55
MDA990-5	S	MDA980-1	400	300		27	55
MDA990-6	S	MDA980-1	600	300		27	55
MDA1330H	S	MDA1330H	5000	25		1.0	40
MDA1331H	S	MDA1330H	10,000	25		1.0	40
MDA1332H	S	MDA1330H	5000	250		2.5	40
MDA1333H	S	MDA1330H	10,000	250		2.5	40
MDA1491-1	S	MDA942	50	25	6.0	1.5	55
MDA1491-2	S	MDA942	100	25	6.0	1.5	55
MDA1491-3	S	MDA942	200	25	6.0	1.5	55
MDA1491-4	S	MDA942	300	25	6.0	1.5	55
MDA1491-5	S	MDA942	400	25	6.0	1.5	55
MDA1491-6	S	MDA942	600	25	6.0	1.5	55
MDA1505-1	S	MDA942	50	200	45	8.0	55
MDA1505-2	S	MDA942	100	200	45	8.0	55
MDA1505-3	S	MDA942	200	200	45	8.0	55
MDA1505-4	S	MDA942	300	200	45	8.0	55
MDA1505-5	S	MDA942	400	200	45	8.0	55
MDA1505-6	S	MDA942	600	200	45	8.0	55
MDA1591-1	S	MDA942	50	100	25	4.0	55
MDA1591-2	S	MDA942	100	100	25	4.0	55
MDA1591-3	S	MDA942	200	100	25	4.0	55
MDA1591-4	S	MDA942	300	100	25	4.0	55
MDA1591-5	S	MDA942	400	100	25	4.0	55
MDA1591-6	S	MDA942	600	100	25	4.0	55



## HOT-CARRIER DIODES and MICRO-I HOT-CARRIER DIODE

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered hot-carrier diodes and MICRO-I hot-carrier diode.

### KEY

Type	Ref.	$V_{(BR)R}$ $I_R = 10\mu A$ Volts Min	$C_T$ $V_R = 0V, F = 1.0MHz(1)$ $V_R = 20V, F = 1.0MHz(2)$ pF Max	$I_R$ $V_R = 3.0V(3)$ $V_R = 25V(4)$ $V_R = 35V(5)$ $\mu A$ Max	$V_F$ $I_F = 10mA$ Volts Max	NF dB Max	$\tau$ ps Max
Alpha-numerical Listings							
Reference device number indicates specific Data Sheet on which device is characterized.							
Reverse Breakdown Voltage							
Diode Capacitance							
Reverse Leakage							
Forward Voltage							
Noise Figure							
Minority Carrier Lifetime							

## HOT-CARRIER DIODES and MICRO-I HOT-CARRIER DIODE

Type	Ref.	$V_{(BR)R}$ $I_R = 10\mu A$ Volts min	$C_T$ $V_R = 0V, F = 1.0MHz(1)$ $V_R = 20V, F = 1.0MHz(2)$ pF Max	$I_R$ $V_R = 3.0V(3)$ $V_R = 25V(4)$ $V_R = 35V(5)$ $\mu A$ Max	$V_F$ $I_F = 10mA$ Volts Max	NF dB Max	$\tau$ ps Max
MBD101	MBD101	4.0	1.0(1)	0.25(3)	0.6	7.0	
MBD102	MBD102	4.0	1.0(1)	0.25(3)	0.6	7.0	
MBD501	MBD501	50	1.0(2)	0.20(4)	1.2		100
MBD502	MBD502	50	1.0(2)	0.20(4)	1.2		
MBD701	MBD501	70	1.0(2)	0.20(5)	1.2		100
MBD702	MBD502	70	1.0(2)	0.20(5)	1.2		
*MBI-101	MBI-101	4.0	1.0(1)	0.25(3)	0.6	7.0	

\*MICRO-I



## LIGHT-EMITTING DIODES

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non registered light-emitting diodes.

### KEY

Type	Material	MAXIMUM RATINGS					ELECTRICAL/OPTICAL CHARACTERISTICS				
		$P_D$ @ 25°C	Ref. Point	$T$ °C Ref. Point	$V_R$ Volts	$I_F$ mA	B Brightness $f_L$ @ $I_F$ mA	CP Candle Power mcd @ $I_F$ mA	$P_O$ Radiated $\mu W$ @ $I_F$ mA	$\lambda_P$ Å	$V_F$ Volts
Alpha-numerical Listings											
GA — Gallium Arsenide GAP — Gallium Arsenide Phosphide GP — Gallium Phosphide											
Power Dissipation @ 25°C Units: M = Milliwatts W = Watts Ref. Point: A, C, J, S Indicates — Ambient, Case, Junction or Stud											
Maximum Temperature Ref. Point: J = Junction S = Storage Junction											
Reverse Voltage											
Forward Current — Continuous											
B = Brightness in Footlamberts											
CP = Candlepower in Millicandela											
$P_O$ = Power Output Radiated in Microwatts											
Peak Emission Wavelength											
Forward Voltage											

### LIGHT-EMITTING DIODES

Type	Material	Use (1)	MAXIMUM RATINGS					ELECTRICAL/OPTICAL CHARACTERISTICS				
			$P_D$ @ 25°C	Ref. Point	$T$ °C Ref. Point	$V_R$ Volts	$I_F$ mA	LIGHT OUTPUT			$\lambda_P$ nm	$V_F$ Volts
								B Brightness $f_L$ @ $I_F$ mA	CP Candle Power mcd @ $I_F$ mA	$P_O$ Radiated $\mu W$ @ $I_F$ mA		
MLED50	GAP	VLED	120M	A	85 J	3.0	50	750 20			660	1.6
MLED55	GAP	VLED	120M	A	85 J	3.0	50		0.3 20		660	2.0
MLED60	GA	ILED	120M	A	85 J	3.0	80			550 50	900	1.2
MLED90	GA	ILED	120M	A	85 J	3.0	80			350 50	900	1.2
MLED600	GAP	VLED	120M	A	85 J	4.0	50	1100 50			660	1.6
MLED610	GAP	VLED	350M	A	125 J	4.0	75	1100 50			660	1.6
MLED650	GAP	ILED	100M	A	85 J	4.0	60				660	2.0
MLED900	GA	ILED	120M	A	85 J	3.0	80			550 50	900	1.2
MLED910	GA	ILED	350M	A	125 J	3.0	150			150 50	900	1.2
MLED930	GA	ILED	250M	A	125 J	3.0	150			650 100	900	1.2
MOR10	GAP	VRR	200M	A	-20 J,S	3.0	10				660	1.7
MOR10A	GAP	VRR	200M	A	+100 to J,S	3.0	10				660	1.7

(1) VLED — Visible Light-Emitting Diode, ILED — Infrared Light-Emitting Diode, VRR — Visible Red Readout



## PIN SWITCHING DIODES and MICRO-I PIN SWITCHING DIODE

The following table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered PIN switching diodes, and Micro-I PIN switching diode.

### KEY

Type	Ref.	$V_{(BR)R}$ $I_R = 10\mu\text{Adc}$ Volts Min	$R_S$ $I_F = *10\text{mA}$ $I_F = 100\text{mAdc}(1)$ $F = 1.0\text{GHz}(1)$ $I_F = 150\text{mAdc}(2)$ $F = 3.0\text{GHz}(2)$ ohm Max	$C_T$ $V_R = 20\text{V}*(3)$ $V_R = 50\text{V}(3)$ $F = 1.0\text{MHz}(3)$ $V_R = 250\text{V}(4)$ $F = 1.0\text{MHz}(4)$ pF Max	$\tau$ $I_F = 50\text{mAdc}$ ns Typ	$L_S$ $F = 3.0\text{GHz}*$ $F = 2.50\text{MHz}$ nH Typ	$C_C$ $F = 1.0\text{MHz}$ $F_T = 1.0\text{MHz}$ pF Typ	$\theta_{JC}$ $^{\circ}\text{C/W}$ Max
Alpha-numerical Listings								
Reference device number indicates specific Data Sheet on which device is characterized.								
Reverse Breakdown Voltage								
Series Resistance								
Total Device Capacitance								
Minority Carrier Lifetime								
Series Inductance								
Case Capacitance								
Thermal Resistance, Junction to Case								

## PIN SWITCHING DIODES and MICRO-I PIN SWITCHING DIODES

Type	Ref.	$V_{(BR)R}$ $I_R = 10\mu\text{Adc}$ Volts Min	$R_S$ $I_F = *10\text{mA}$ $I_F = 100\text{mA}(1)$ $F = 1.0\text{GHz}(1)$ $I_F = 150\text{mA}(2)$ $F = 3.0\text{GHz}(2)$ ohm Max	$C_T$ $V_R = 20\text{V}*(3)$ $V_R = 50\text{V}(3)$ $F = 1.0\text{MHz}(3)$ $V_R = 250\text{V}(4)$ $F = 1.0\text{MHz}(4)$ pF Max	$\tau$ $I_F = 50\text{mA}$ ns Typ	$L_S$ $F = 3.0\text{GHz}$ $F = 2.50\text{MHz}$ nH Typ	$C_C$ $F = 1.0\text{MHz}$ $F_T = 1.0\text{MHz}*$ pF Typ	$\theta_{JC}$ $^{\circ}\text{C/W}$ Max
*MPI-3401	MPI-3401	35	0.7*	1.0*		3.0	0.15*	
MPN3201	MPN3201	150	1.0 (1)	0.44(3)	150	0.85	0.18	25
MPN3202	MPN3201	200	1.0 (2)	0.40(3)	150	0.85	0.18	25
MPN3208	MPN3208	800	0.4 (2)	4.0 (4)		0.55*	1.1*	4.0
MPN3209	MPN3208	900	0.4 (2)	4.0 (4)		0.55*	1.1*	4.0
MPN3401	MPN3401	35	0.7*	1.0*		3.0	0.1	
MPN3402	MPN3401	35	0.6*	2.0*		3.0	0.1	

\*MICRO-I



SWITCHING DIODES

The following table contains an alpha-numerical listing and short-form specifications for Motorola in-house non registered switching diodes.

3

KEY

SWITCHING DIODES

Type	Ref.	V(BR) @ Volts Min	I(BR) μA	V <sub>F</sub> @ Volts Min      Max	I <sub>F</sub> mA	I <sub>R</sub> @ μA Max	V <sub>R</sub> Volts	C <sub>c</sub> V <sub>R</sub> = 0 pF	t <sub>rr</sub> *Typical ns Max
Alpha-numerical Listings									
Reference decive number indicates specific Data Sheet on which device is characterized									
Breakdown Voltage									
Forward Voltage									
Reverse Current									
Capacitance									
Reverse Recovery Time									

SWITCHING DIODES

Type	Ref.	V(BR) Volts @ Min	I(BR) μA	V <sub>F</sub> Volts Min      Max	I <sub>F</sub> mA	I <sub>R</sub> μA Max	V <sub>R</sub> Volts	C <sub>c</sub> V <sub>R</sub> = 0 pF	t <sub>rr</sub> *Typical ns Max
MMD70	MMD70	50	100	0.75    1.2	100	0.1	30	2.5	15
MMD6050	MMD6050	70	100	0.55    0.7	100	0.1	50	2.0	5.0
MMD6100	MMD6050	70	100	0.55    0.7	100	0.1	50	2.0	5.0
MMD6150	MMD6050	70	100	0.55    0.7	100	0.1	50	2.0	5.0
MMD7000	MMD6050	70	100	0.55    0.7	100	0.1	50	2.0	5.0
MMD7001	MMD7001	40	10	1.05	300	0.1	30	3.5	3.2*



## 3

The following table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered optoelectronic photo detectors and transistors.

## KEY

[illegible]



# OPTOELECTRONIC PHOTO DETECTORS and TRANSISTORS

Type	Material	Polarity	Ref.	Use	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS				
					P <sub>D</sub> @ 25°C	Ref Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> Volts	Subscript	S <sub>RCEO</sub> Sensitivity mA/mW/cm <sup>2</sup> nA/mW/cm <sup>2</sup> * μW/mW/cm <sup>2</sup> **	I <sub>CEO</sub> Dark Current nA	t <sub>r</sub> + t <sub>f</sub> ns* μs	I <sub>L</sub> Light Current* μA* mA
MRD14B	S	N	2N5777	RD	200M	A	100	18	12	0	1.0	100	400	2.0
MRD150	S	N	MRD150	RD	50M	A	85	80	40	0	0.04	100	6.5	0.2
MRD300	S	N	MRD300	RD	250M	A	200		50	0		25	6.5	4.0
MRD310	S	N	MRD300	RD	250M	A	200		50	0		25	6.5	1.0
MRD450	S	N	MRD450	RD	100M	A	85		40	0	0.2	100	6.5	1.0
MRD500	S	N	MRD500	RD	100M	A	200			0	1.2**	2.0	1.0*	6.0*
MRD510	S	N	MRD500	RD	100M	A	200			0	0.3**	2.0	1.0*	1.5*
MRD601	S	N	MRD601	PD	50M	A	125		50	0	0.025	25	4.8	0.5
MRD602	S	N	MRD601	PD	50M	A	125		50		0.1	25	4.8	2.0
MRD603	S	N	MRD601	PD	50M	A	125		50		0.2	25	4.8	4.0
MRD604	S	N	MRD601	PD	50M	A	125		50	0	0.35	25	4.8	7.0
MRD810	S	N	MRD810	RD	250M	A	125		35	0	0.2	50	11	1.0
MRD3050	S	N	MRD3050	RD	400M	A	200	40	30	0	0.02	100	5.5	0.1
MRD3051	S	N	MRD3050	RD	400M	A	200	40	30	0	0.04	100	5.5	0.2
MRD3052	S	N	MRD3050	RD	400M	A	200	40	30	0	0.02	100	5.5	0.1
MRD3053	S	N	MRD3050	RD	400M	A	125	40	30	0	0.05	100	5.5	0.25
MRD3054	S	N	MRD3050	RD	400M	A	200	40	30	0	0.125	100	5.5	0.625
MRD3055	S	N	MRD3050	RD	400M	A	200	40	30	0	0.3	100	5.5	1.5
MRD3056	S	N	MRD3050	RD	400M	A	200	40	30	0	0.4	100	5.5	2.0



OPTOELECTRONIC COUPLERS

The following table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered optoelectronic couplers.

KEY

MAXIMUM RATINGS											ELECTRICAL CHARACTERISTICS																		
Type	Material	Polarity	Ref	Use	P <sub>D</sub> @ 25° C	Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> Volts	Subscript	I <sub>C</sub> mA		V <sub>CE(sat)</sub> Volts		V <sub>ISO</sub> Volts	t <sub>d</sub> + t <sub>r</sub> μs	t <sub>s</sub> + t <sub>f</sub>	Frequency Response kHz Typ											
Alpha-Numerical Listing	GA = Gallium Arsenide										Min	Typ	Typ	Max	Min	Typ		Frequency Response Units: kHz											
GA = Gallium Arsenide																													
N = N-Channel																													
Reference Device number indicates specific Data Sheet on which device is characterized.																													
OC = Optoelectronic Coupler																													
Power Dissipation @ 25° C Units: M = milliwatts W = watts																													
Ref. Point: A, C, J, S, Indicates Ambient, Case, Junction or Stud																													
Maximum Operating Junction Temperature																													
Maximum Collector-Base Voltage Units: Volts																													
											Electrical Characteristics																		
											Maximum Collector-Emitter Voltage (Subscript Identifiers Condition) O = V <sub>CEO</sub> , Base Open R = V <sub>CER</sub> , Specified Resistance S = V <sub>CES</sub> , Base Shorted V = V <sub>CEV</sub> , Used when only Voltage bias is used X = V <sub>CEX</sub> , Base-Emitter Back Biased U = V <sub>CE</sub> , Termination Undefined																		

MAXIMUM RATINGS											ELECTRICAL CHARACTERISTICS								
Type	Material	Polarity	Ref.	Use	P <sub>D</sub> @ 25°C	Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> Volts	Subscript	I <sub>C</sub> mA		V <sub>CE(sat)</sub> Volts		V <sub>ISO</sub> Vdc Min	Switching μs Typ			Frequency Response kHz Typ
											@ V <sub>CE</sub> = 10V, I <sub>F</sub> = 10mA @ V <sub>CE</sub> = 10V, I <sub>F</sub> = 35mA*	@ I <sub>C</sub> = 2.0mA, I <sub>F</sub> = 50mA @ I <sub>C</sub> = 10mA, I <sub>F</sub> = 10mA*	Min	Typ		Typ	Max	t <sub>d</sub> + t <sub>r</sub>	t <sub>s</sub> + t <sub>f</sub>
MOC1000	GA	N	MOC1000	OC	250 M	A	100	70	30	0	2.0	5.0	0.2	0.5	1500	0.87	11	300	
MOC1001	GA	N	MOC1000	OC	250 M	A	100	70	30	0	2.0	5.0	0.2	0.5	2500	0.87	11	300	
MOC1002	GA	N	MOC1000	OC	250 M	A	100	70	30	0	1.0	3.0	0.2	0.5	1500	2.1	5.0	300	
MOC1003	GA	N	MOC1000	OC	250 M	A	100	70	30	0	1.0	3.0	0.2	0.5	500	2.1	5.0	300	
MOC1200	GA	N	MOC1200	OC	150 M	A	100	20	30	0	10	50	—	1.0*	1500	2.0*	19*	30	
MOC2000	GA	N	MOC2000	OC	150 M	A	125	70	30	0	1.6*	—	—	—	1500	—	—	—	



THYRISTORS

The following tables contain an alpha-numerical listing and short-form specifications for Motorola in-house non registered thyristors.

KEY

TYPE	REFERENCE	$I_T(RMS)$ Amp	$V_{DRM}/V_{RRM}$ Volts	$T_J$ $T_C^{(1)}$ $^{\circ}C$	$I_{GT}$ mA	$V_{GT}$ Volts
Numerical Listing of Registered Type Numbers. *Device with gate turn-off characteristics						
Reference device number indicates specific Data Sheet on which device is characterized						
On-State (RMS) Current						
Peak Forward Blocking Voltage						
Peak Reverse Blocking Voltage						
Maximum Junction Temperature, Maximum Case Temperature(1)						
Gate Trigger Current						
Gate Trigger Voltage						



## THYRISTOR INDEX

Type	Ref.	$I_T(\text{RMS})$ Amp	$V_{\text{DRM}}/V_{\text{RRM}}$ Volts	$T_J T_C^{(1)}$ °C	$I_{\text{GT}}$ mA	$V_{\text{GT}}$ Volts
MAC1-1	MAC1	10	25	100	40	2.0
MAC1-2	MAC1	10	50	100	40	2.0
MAC1-3	MAC1	10	100	100	40	2.0
MAC1-4	MAC1	10	200	100	40	2.0
MAC1-5	MAC1	10	300	100	40	2.0
MAC1-6	MAC1	10	400	100	40	2.0
MAC1-7	MAC1	10	500	100	40	2.0
MAC1-8	MAC1	10	600	100	40	2.0
MAC2-1	2N6139	10	25	100	40	2.0
MAC2-2	2N6139	10	50	100	40	2.0
MAC2-3	2N6139	10	100	100	40	2.0
MAC3-1	2N6139	10	25	100	40	2.0
MAC3-2	2N6139	10	50	100	40	2.0
MAC3-3	2N6139	10	100	100	40	2.0
MAC4-1	MAC4-1	10	25	100	50	2.5
MAC4-2	MAC1	10	50	100	50	2.5
MAC4-3	MAC1	10	100	100	50	2.5
MAC4-4	MAC1	10	200	100	50	2.5
MAC4-5	MAC1	10	300	100	50	2.5
MAC4-6	MAC1	10	400	100	50	2.5
MAC4-7	MAC1	10	500	100	50	2.5
MAC4-8	MAC1	10	600	100	50	2.5
MAC5-1	MAC1	10	25	100	50	2.5
MAC5-2	MAC1	10	50	100	50	2.5
MAC5-3	MAC1	10	100	100	50	2.5
MAC5-4	MAC1	10	200	100	50	2.5
MAC5-5	MAC1	10	300	100	50	2.5
MAC5-6	MAC1	10	400	100	50	2.5
MAC5-7	MAC1	10	500	100	50	2.5
MAC5-8	MAC1	10	600	100	50	2.5
MAC6-1	MAC1	10	25	100	50	2.5
MAC6-2	MAC1	10	50	100	50	2.5
MAC6-3	MAC1	10	100	100	50	2.5
MAC6-4	MAC1	10	200	100	50	2.5
MAC6-5	MAC1	10	300	100	50	2.5
MAC6-6	MAC1	10	400	100	50	2.5
MAC6-7	MAC1	10	500	100	50	2.5
MAC6-8	MAC1	10	600	100	50	2.5
MAC10-1	MAC10-1	10	25	100	50	2.0
MAC10-2	MAC10-1	10	50	100	50	2.0



# THYRISTOR INDEX (continued)

Type	Ref.	$I_T$ (RMS) Amp	$V_{DRM}/V_{RRM}$ Volts	$T_J T_C^{(1)}$ °C	$I_{GT}$ mA	$V_{GT}$ Volts
MAC10-3	MAC10-1	10	100	100	50	2.0
MAC10-4	MAC10-1	10	200	100	50	2.0
MAC10-5	MAC10-1	10	300	100	50	2.0
MAC10-6	MAC10-1	10	400	100	50	2.0
MAC10-7	MAC10-1	10	500	100	50	2.0
MAC10-8	MAC10-1	10	600	100	50	2.0
MAC11-1	MAC10-1	10	25	100	50	2.0
MAC11-2	MAC10-1	10	50	100	50	2.0
MAC11-3	MAC10-1	10	100	100	50	2.0
MAC11-4	MAC10-1	10	200	100	50	2.0
MAC11-5	MAC10-1	10	300	100	50	2.0
MAC11-6	MAC10-1	10	400	100	50	2.0
MAC11-7	MAC10-1	10	500	100	50	2.0
MAC11-8	MAC10-1	10	600	100	50	2.0
MAC35-1	2N6157	25	25	125	60	2.0
MAC35-2	2N6157	25	50	125	60	2.0
MAC35-3	2N6157	25	100	125	60	2.0
MAC35-4	2N6157	25	200	125	60	2.0
MAC35-5	2N6157	25	300	125	60	2.0
MAC35-6	2N6157	25	400	125	60	2.0
MAC35-7	2N6157	25	600	125	60	2.0
MAC36-1	2N6157	25	25	125	60	2.0
MAC36-2	2N6157	25	50	125	60	2.0
MAC36-3	2N6157	25	100	125	60	2.0
MAC36-4	2N6157	25	200	125	60	2.0
MAC36-5	2N6157	25	300	125	60	2.0
MAC36-6	2N6157	25	400	125	60	2.0
MAC36-7	2N6157	25	600	125	60	2.0
MAC37-1	MAC37-1	25	25	110	75	3.0
MAC37-2	MAC37-1	25	50	110	75	3.0
MAC37-3	MAC37-1	25	100	110	75	3.0
MAC37-4	MAC37-1	25	200	110	75	3.0
MAC37-5	MAC37-1	25	300	110	75	3.0
MAC37-6	MAC37-1	25	400	110	75	3.0
MAC37-7	MAC37-1	25	500	110	75	3.0
MAC38-1	MAC37-1	25	25	110	75	3.0
MAC38-2	MAC37-1	25	50	110	75	3.0
MAC38-3	MAC37-1	25	100	110	75	3.0
MAC38-4	MAC37-1	25	200	110	75	3.0
MAC38-5	MAC37-1	25	300	110	75	3.0
MAC38-6	MAC37-1	25	400	110	75	3.0
MAC38-7	MAC37-1	25	500	110	75	3.0
MAC40688	2N5441	40	200	110	70	2.0
MAC40689	2N5441	40	400	110	70	2.0
MAC40690	2N5441	40	600	110	70	2.0
MCR32-05	MCR32	7.0	50	135	20	1.5
MCR32-20	MCR32	7.0	200	135	20	1.5
MCR32-30	MCR32	7.0	300	135	20	1.5
MCR32-40	MCR32	7.0	400	135	20	1.5
MCR32-50	MCR32	7.0	500	135	20	1.5
MCR32-60	MCR32	7.0	600	135	20	1.5
MCR35-05	MCR35	35	50	100	40	1.6
MCR35-10	MCR35	35	100	100	40	1.6
MCR35-20	MCR35	35	200	100	40	1.6
MCR35-40	MCR35	35	400	100	40	1.6
MCR35-60	MCR35	35	600	100	40	1.6
MCR35-80	MCR35	35	800	100	40	1.6
MCR36-05	MCR35	35	50	100	40	1.6
MCR36-10	MCR35	35	100	100	40	1.6
MCR36-20	MCR35	35	200	100	40	1.6



# THYRISTOR INDEX (continued)

Type	Ref.	$I_T$ (RMS) Amp	$V_{DRM}/V_{RRM}$ Volts	$T_J T_C$ <sup>(1)</sup> °C	$I_{GT}$ mA	$V_{GT}$ Volts
MCR36-40	MCR35	35	400	100	40	1.6
MCR36-60	MCR35	35	600	100	40	1.6
MCR36-80	MCR35	35	800	100	40	1.6
MCR39-05	MCR39	7.0	50	135	15	1.25
MCR39-20	MCR39	7.0	200	135	15	1.25
MCR39-30	MCR39	7.0	300	135	15	1.25
MCR39-40	MCR39	7.0	400	135	15	1.25
MCR39-50	MCR39	7.0	500	135	15	1.25
MCR39-60	MCR39	7.0	600	135	15	1.25
MCR051	MCR051	0.25	15	125	0.2	0.8
MCR052	MCR051	0.25	30	125	0.2	0.8
MCR053	MCR051	0.25	60	125	0.2	0.8
MCR054	MCR051	0.25	100	125	0.2	0.8
MCR101	MCR101	0.8	15	85	0.1	1.7
MCR102	MCR101	0.8	30	85	0.1	1.7
MCR103	MCR101	0.8	60	85	0.1	1.7
MCR104	MCR101	0.8	100	85	0.1	1.7
MCR106-1	MCR106-1	4.0	30	110	0.5	1.0
MCR106-2	MCR106-1	4.0	60	110	0.5	1.0
MCR106-3	MCR106-1	4.0	100	110	0.5	1.0
MCR106-4	MCR106-1	4.0	200	110	0.5	1.0
MCR115	MCR115	0.8	150	110	0.2	0.8
MCR120	MCR120	0.8	200	110	0.2	0.8
MCR154-10	MCR154	110	100	125	150	3.0
MCR154-20	MCR154	110	200	125	150	3.0
MCR154-30	MCR154	110	300	125	150	3.0
MCR154-40	MCR154	110	400	125	150	3.0
MCR154-50	MCR154	110	500	125	150	3.0
MCR154-60	MCR154	110	600	125	150	3.0
MCR155-10	MCR154	110	100	125	150	3.0
MCR155-20	MCR154	110	200	125	150	3.0
MCR155-30	MCR154	110	300	125	150	3.0
MCR155-40	MCR154	110	400	125	150	3.0
MCR155-50	MCR154	110	500	125	150	3.0
MCR155-60	MCR154	110	600	125	150	3.0
MCR156-10	MCR154	110	100	125	150	3.0
MCR156-20	MCR154	110	200	125	150	3.0
MCR156-30	MCR154	110	300	125	150	3.0
MCR156-40	MCR154	110	400	125	150	3.0
MCR156-50	MCR154	110	500	125	150	3.0
MCR156-60	MCR154	110	600	125	150	3.0
MCR157-10	MCR154	110	100	125	150	3.0
MCR157-20	MCR154	110	200	125	150	3.0
MCR157-30	MCR154	110	300	125	150	3.0
MCR157-40	MCR154	110	400	125	150	3.0
MCR157-50	MCR154	110	500	125	150	3.0
MCR157-60	MCR154	110	600	125	150	3.0
MCR158-50	MCR158	110	500	125	150	3.0
MCR158-60	MCR158	110	600	125	150	3.0
MCR158-70	MCR158	110	700	125	150	3.0
MCR158-80	MCR158	110	800	125	150	3.0
MCR158-90	MCR158	110	900	125	150	3.0
MCR158-100	MCR158	110	1000	125	150	3.0
MCR158-110	MCR158	110	1100	125	150	3.0
MCR158-120	MCR158	110	1200	125	150	3.0
MCR159-50	MCR158	110	500	125	150	3.0
MCR159-60	MCR158	110	600	125	150	3.0
MCR159-70	MCR158	110	700	125	150	3.0
MCR159-80	MCR158	110	800	125	150	3.0
MCR159-90	MCR158	110	900	125	150	3.0



# THYRISTOR INDEX(continued)

Type	Ref.	I <sub>T</sub> (RMS) Amp	V <sub>DRM</sub> /V <sub>RRM</sub> Volts	T <sub>J</sub> T <sub>C</sub> <sup>(1)</sup> °C	I <sub>GT</sub> mA	V <sub>GT</sub> Volts
MCR159-100	MCR158	110	1000	125	150	3.0
MCR159-110	MCR158	110	1100	125	150	3.0
MCR159-120	MCR158	110	1200	125	150	3.0
MCR201	MCR201	0.5	15	110	0.2	0.8
MCR202	MCR201	0.5	30	110	0.2	0.8
MCR203	MCR201	0.5	60	110	0.2	0.8
MCR204	MCR201	0.5	100	110	0.2	0.8
MCR205	MCR201	0.5	150	110	0.2	0.8
MCR206	MCR201	0.5	200	110	0.2	0.8
MCR235-10	MCR235	235	100	125	150	3.0
MCR235-20	MCR235	235	200	125	150	3.0
MCR235-30	MCR235	235	300	125	150	3.0
MCR235-40	MCR235	235	400	125	150	3.0
MCR235-50	MCR235	235	500	125	150	3.0
MCR235-60	MCR235	235	600	125	150	3.0
MCR235-70	MCR235	235	700	125	150	3.0
MCR235-80	MCR235	235	800	125	150	3.0
MCR235-90	MCR235	235	900	125	150	3.0
MCR235-100	MCR235	235	1000	125	150	3.0
MCR235-110	MCR235	235	1100	125	150	3.0
MCR235-120	MCR235	235	1200	125	150	3.0
MCR235-130	MCR235	235	1300	125	150	3.0
MCR235-140	MCR235	235	1400	125	150	3.0
MCR235-150	MCR235	235	1500	125	150	3.0
MCR235A-10	MCR235A	235	100	125	150	3.0
MCR235A-20	MCR235A	235	200	125	150	3.0
MCR235A-30	MCR235A	235	300	125	150	3.0
MCR235A-40	MCR235A	235	400	125	150	3.0
MCR235A-50	MCR235A	235	500	125	150	3.0
MCR235A-60	MCR235A	235	600	125	150	3.0
MCR235B-10	MCR235A	235	100	125	150	3.0
MCR235B-20	MCR235A	235	200	125	150	3.0
MCR235B-30	MCR235A	235	300	125	150	3.0
MCR235B-40	MCR235A	235	400	125	150	3.0
MCR235B-50	MCR235A	235	500	125	150	3.0
MCR235B-60	MCR235A	235	600	125	150	3.0
MCR235B-70	MCR235A	235	700	125	150	3.0
MCR235B-80	MCR235A	235	800	125	150	3.0
MCR235C-10	MCR235A	235	100	125	150	3.0
MCR235C-20	MCR235A	235	200	125	150	3.0
MCR235C-30	MCR235A	235	300	125	150	3.0
MCR235C-40	MCR235A	235	400	125	150	3.0
MCR235C-50	MCR235A	235	500	125	150	3.0
MCR235C-60	MCR235A	235	600	125	150	3.0
MCR235C-70	MCR235A	235	700	125	150	3.0
MCR235C-80	MCR235A	235	800	125	150	3.0
MCR235C-90	MCR235A	235	900	125	150	3.0
MCR235C-100	MCR235A	235	1000	125	150	3.0
MCR320-1	MCR320	7.0	25	100	20	1.5
MCR320-2	MCR320	7.0	50	100	20	1.5
MCR320-3	MCR320	7.0	100	100	20	1.5
MCR320-4	MCR320	7.0	200	100	20	1.5
MCR320-5	MCR320	7.0	300	100	20	1.5
MCR320-6	MCR320	7.0	400	100	20	1.5
MCR320-7	MCR320	7.0	500	100	20	1.5
MCR320-8	MCR320	7.0	600	100	20	1.5
MCR380-10	MCR380	380	100	125	150	3.0
MCR380-20	MCR380	380	200	125	150	3.0
MCR380-30	MCR380	380	300	125	150	3.0
MCR380-40	MCR380	380	400	125	150	3.0



# THYRISTOR INDEX (continued)

Type	Ref.	$I_T$ (RMS) Amp	$V_{DRM}/V_{RRM}$ Volts	$T_J T_C$ (1) °C	$I_{GT}$ mA	$V_{GT}$ Volts
MCR380-50	MCR380	380	500	125	150	3.0
MCR380-60	MCR380	380	600	125	150	3.0
MCR380-70	MCR380	380	700	125	150	3.0
MCR380-80	MCR380	380	800	125	150	3.0
MCR380-90	MCR380	380	900	125	150	3.0
MCR380-100	MCR380	380	1000	125	150	3.0
MCR380-110	MCR380	380	1100	125	150	3.0
MCR380-120	MCR380	380	1200	125	150	3.0
MCR380-130	MCR380	380	1300	125	150	3.0
MCR380-140	MCR380	380	1400	125	150	3.0
MCR380-150	MCR380	380	1500	125	150	3.0
MCR380B-10	MCR380B	380	100	125	150	3.0
MCR380B-20	MCR380B	380	200	125	150	3.0
MCR380B-30	MCR380B	380	300	125	150	3.0
MCR380B-40	MCR380B	380	400	125	150	3.0
MCR380B-50	MCR380B	380	500	125	150	3.0
MCR380B-60	MCR380B	380	600	125	150	3.0
MCR380B-70	MCR380B	380	700	125	150	3.0
MCR380B-80	MCR380B	380	800	125	150	3.0
MCR380C-10	MCR380B	380	100	125	150	3.0
MCR380C-20	MCR380B	380	200	125	150	3.0
MCR380C-30	MCR380B	380	300	125	150	3.0
MCR380C-40	MCR380B	380	400	125	150	3.0
MCR380C-50	MCR380B	380	500	125	150	3.0
MCR380C-60	MCR380B	380	600	125	150	3.0
MCR380C-70	MCR380B	380	700	125	150	3.0
MCR380C-80	MCR380B	380	800	125	150	3.0
MCR380C-90	MCR380B	380	900	125	150	3.0
MCR380C-100	MCR380B	380	1000	125	150	3.0
MCR380D-10	MCR380B	380	100	125	150	3.0
MCR380D-20	MCR380B	380	200	125	150	3.0
MCR380D-30	MCR380B	380	300	125	150	3.0
MCR380D-40	MCR380B	380	400	125	150	3.0
MCR380D-50	MCR380B	380	500	125	150	3.0
MCR380D-60	MCR380B	380	600	125	150	3.0
MCR380D-70	MCR380B	380	700	125	150	3.0
MCR380D-80	MCR380B	380	800	125	150	3.0
MCR380D-90	MCR380B	380	900	125	150	3.0
MCR380D-100	MCR380B	380	1000	125	150	3.0
MCR380D-110	MCR380B	380	1100	125	150	3.0
MCR380D-120	MCR380B	380	1200	125	150	3.0
MCR406-1	MCR406	4.0	30	110	0.2	0.8
MCR406-2	MCR406	4.0	60	110	0.2	0.8
MCR406-3	MCR406	4.0	100	110	0.2	0.8
MCR406-4	MCR406	4.0	200	110	0.2	0.8
MCR407-1	MCR407	4.0	30	110	0.5	1.0
MCR407-2	MCR407	4.0	60	110	0.5	1.0
MCR407-3	MCR407	4.0	100	110	0.5	1.0
MCR407-4	MCR407	4.0	200	110	0.5	1.0
MCR470-10	MCR470	470	100	125	150	3.0
MCR470-20	MCR470	470	200	125	150	3.0
MCR470-30	MCR470	470	300	125	150	3.0
MCR470-40	MCR470	470	400	125	150	3.0
MCR470-50	MCR470	470	500	125	150	3.0
MCR470-60	MCR470	470	600	125	150	3.0
MCR470-70	MCR470	470	700	125	150	3.0
MCR470-80	MCR470	470	800	125	150	3.0
MCR470-90	MCR470	470	900	125	150	3.0
MCR470-100	MCR470	470	1000	125	150	3.0
MCR470-110	MCR470	470	1100	125	150	3.0



**THYRISTOR INDEX**
(continued)

Type	Ref.	IT(RMS) Amp	VDRM/VRRM Volts	TJTC (1) °C	IGT mA	VGT Volts
MCR470-120	MCR470	470	1200	125	150	3.0
MCR470-130	MCR470	470	1300	125	150	3.0
MCR470-140	MCR470	470	1400	125	150	3.0
MCR470-150	MCR470	470	1500	125	150	3.0
MCR470C-10	MCR470C	470	100	125	150	3.0
MCR470C-20	MCR470C	470	200	125	150	3.0
MCR470C-30	MCR470C	470	300	125	150	3.0
MCR470C-40	MCR470C	470	400	125	150	3.0
MCR470C-50	MCR470C	470	500	125	150	3.0
MCR470C-60	MCR470C	470	600	125	150	3.0
MCR470C-70	MCR470C	470	700	125	150	3.0
MCR470C-80	MCR470C	470	800	125	150	3.0
MCR470D-10	MCR470C	470	100	125	150	3.0
MCR470D-20	MCR470C	470	200	125	150	3.0
MCR470D-30	MCR470C	470	300	125	150	3.0
MCR470D-40	MCR470C	470	400	125	150	3.0
MCR470D-50	MCR470C	470	500	125	150	3.0
MCR470D-60	MCR470C	470	600	125	150	3.0
MCR470D-70	MCR470C	470	700	125	150	3.0
MCR470D-80	MCR470C	470	800	125	150	3.0
MCR470D-90	MCR470C	470	900	125	150	3.0
MCR470D-100	MCR470C	470	1000	125	150	3.0
MCR470E-10	MCR470C	470	100	125	150	3.0
MCR470E-20	MCR470C	470	200	125	150	3.0
MCR470E-30	MCR470C	470	300	125	150	3.0
MCR470E-40	MCR470C	470	400	125	150	3.0
MCR470E-50	MCR470C	470	500	125	150	3.0
MCR470E-60	MCR470C	470	600	125	150	3.0
MCR470E-70	MCR470C	470	700	125	150	3.0
MCR470E-80	MCR470C	470	800	125	150	3.0
MCR470E-90	MCR470C	470	900	125	150	3.0
MCR470E-100	MCR470C	470	1000	125	150	3.0
MCR470E-110	MCR470C	470	1100	125	150	3.0
MCR470E-120	MCR470C	470	1200	125	150	3.0
MCR649-1	MCR649	20	25	100	80	3.5
MCR649-2	MCR649	20	50	100	80	3.5
MCR649-3	MCR649	20	100	100	80	3.5
MCR649-4	MCR649	20	200	100	80	3.5
MCR649-5	MCR649	20	300	100	80	3.5
MCR649-6	MCR649	20	400	100	80	3.5
MCR649-7	MCR649	20	500	100	80	3.5
MCR729-5	MCR729	2.0	50	105	50	1.5
MCR729-6	MCR729	2.0	50	105	50	1.5
MCR729-7	MCR729	2.0	50	105	50	1.5
MCR729-8	MCR729	2.0	50	105	50	1.5
MCR729-9	MCR729	2.0	50	105	50	1.5
MCR729-10	MCR729	2.0	50	105	50	1.5
MCR1336-5	MCR1336	2.0	300	105	40	1.25
MCR1336-6	MCR1336	2.0	400	105	40	1.25
MCR1336-7	MCR1336	2.0	500	105	40	1.25
MCR1336-8	MCR1336	2.0	600	105	40	1.25
MCR1336-9	MCR1336	2.0	700	105	40	1.25
MCR1336-10	MCR1336	2.0	800	105	40	1.25
MCR1718-5	MCR1718	25	300	125	50	1.5
MCR1718-6	MCR1718	25	400	125	50	1.5
MCR1718-7	MCR1718	25	500	125	50	1.5
MCR1718-8	MCR1718	25	600	125	50	1.5
MCR1906-1	MCR1906	1.6	25	100	1.0	1.0
MCR1906-2	MCR1906	1.6	50	100	1.0	1.0
MCR1906-3	MCR1906	1.6	100	100	1.0	1.0



# THYRISTOR INDEX (continued)

Type	Ref.	$I_T(\text{RMS})$ Amp	$V_{\text{DRM}}/V_{\text{RRM}}$ Volts	$T_J T_C^{(1)}$ °C	$I_{\text{GT}}$ mA	$V_{\text{GT}}$ Volts
MCR1906-4	MCR1906	1.6	200	100	1.0	1.0
MCR1907-1	MCR1907	25	35	125	30	1.5
MCR1907-2	MCR1907	25	75	125	30	1.5
MCR1907-3	MCR1907	25	150	125	30	1.5
MCR1907-4	MCR1907	25	300	125	30	1.5
MCR1907-5	MCR1907	25	400	125	30	1.5
MCR1907-6	MCR1907	25	500	125	30	1.5
MCR2315-1	MCR2315	8.0	25	100	40	1.5
MCR2315-2	MCR2315	8.0	50	100	40	1.5
MCR2315-3	MCR2315	8.0	100	100	40	1.5
MCR2315-4	MCR2315	8.0	200	100	40	1.5
MCR2315-5	MCR2315	8.0	300	100	40	1.5
MCR2315-6	MCR2315	8.0	400	100	40	1.5
MCR2614L-1	MCR2315	8.0	25	100	40	1.5
MCR2614L-2	MCR2315	8.0	50	100	40	1.5
MCR2614L-3	MCR2315	8.0	100	100	40	1.5
MCR2614L-4	MCR2315	8.0	200	100	40	1.5
MCR2614L-5	MCR2315	8.0	300	100	40	1.5
MCR2614L-6	MCR2315	8.0	400	100	40	1.5
MCR3818-1	MCR3818-1	20	25	100	40	1.5
MCR3818-2	MCR3818-1	20	50	100	40	1.5
MCR3818-3	MCR3818-1	20	100	100	40	1.5
MCR3818-4	MCR3818-1	20	200	100	40	1.5
MCR3818-5	MCR3818-1	20	300	100	40	1.5
MCR3818-6	MCR3818-1	20	400	100	40	1.5
MCR3818-7	MCR3818-1	20	500	100	40	1.5
MCR3818-8	MCR3818-1	20	600	100	40	1.5
MCR3918-1	MCR3818-1	20	25	100	40	1.5
MCR3918-2	MCR3818-1	20	50	100	40	1.5
MCR3918-3	MCR3818-1	20	100	100	40	1.5
MCR3918-4	MCR3818-1	20	200	100	40	1.5
MCR3918-5	MCR3818-1	20	300	100	40	1.5
MCR3918-6	MCR3818-1	20	400	100	40	1.5
MCR3918-7	MCR3818-1	20	500	100	40	1.5
MCR3918-8	MCR3818-1	20	600	100	40	1.5
MCR3835-1	MCR3835-1	35	25	100	40	1.5
MCR3835-2	MCR3835-1	35	50	100	40	1.5
MCR3835-3	MCR3835-1	35	100	100	40	1.5
MCR3835-4	MCR3835-1	35	200	100	40	1.5
MCR3835-5	MCR3835-1	35	300	100	40	1.5
MCR3835-6	MCR3835-1	35	400	100	40	1.5
MCR3835-7	MCR3835-1	35	500	100	40	1.5
MCR3835-8	MCR3835-1	35	600	100	40	1.5
MCR3935-1	MCR3835-1	35	25	100	40	1.5
MCR3935-2	MCR3835-1	35	50	100	40	1.5
MCR3935-3	MCR3835-1	35	100	100	40	1.5
MCR3935-4	MCR3835-1	35	200	100	40	1.5
MCR3935-5	MCR3835-1	35	300	100	40	1.5
MCR3935-6	MCR3835-1	35	400	100	40	1.5
MCR3935-7	MCR3835-1	35	500	100	40	1.5
MCR3935-8	MCR3835-1	35	600	100	40	1.5



## TRIGGERS

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non registered bidirectional switch.

3

### KEY

#### BIDIRECTIONAL SWITCH

Type	Ref.	$V_S$		$ V_{S1} - V_{S2} $ Max	$I_S$ Max	$I_H$ Max	$V_F$ Max
		Min	Max				
Alpha-Numerical Listings							
Reference device number indicates specific Data Sheet on which device is characterized.							
Switching Voltage							
Switching Voltage Differential							
Switching Current							
Holding Current							
Forward On-State Voltage							

#### BIDIRECTIONAL SWITCH

Type	Ref.	$V_S$		$ V_{S1} - V_{S2} $ Max	$I_S$ Max	$I_H$ Max	$V_F$ Max
		Min	Max				
MBS100	MBS100	3.0	5.0	0.35	400	1.0	2.0
MBS4991	MBS4991	6.0	10	0.5	350	1.5	1.7
MBS4992	MBS4991	7.5	9.0	0.2	120	0.5	1.7



## BILATERAL TRIGGER DIACS

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non registered bilateral trigger diacs.

3

### KEY

Type	Ref.	V(BR) Volts Nom	$\Delta V$ Volts Min	I(BR) $\mu A$ Max	I <sub>Pulse</sub> @ 30 $\mu s$ , 120 Hz Amp Max
Alpha-Numerical Listings					
Reference device number indicates specific Data Sheet on which device is characterized.					
Breakdown Voltage (both directions)					
Switchback (Delta) Voltage (both directions)					
Breakdown Current (both directions)					
Peak Pulse Current					

### BILATERAL TRIGGER DIACS

Type	Ref.	V(BR) Volts Nom	$\Delta V$ Volts Min	I(BR) $\mu A$ Max	I <sub>Pulse</sub> @ 30 $\mu s$ , 120 Hz Amp Max
MPT20	1N5758	20	5.0	100	2.0
MPT28	1N5758	28	7.0	50	2.0
MPT32	1N5758	32	7.0	50	2.0



UNIDIRECTIONAL SWITCH

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non registered unidirectional switch.

KEY

Type	Ref	V <sub>S</sub> Volts		I <sub>S</sub> μA	I <sub>H</sub> mA	V <sub>F</sub> I <sub>F</sub> = 150 mA	I <sub>B</sub> μA	P <sub>D</sub> mW	V <sub>R</sub> Volts	V <sub>O</sub> Volts	I <sub>F</sub> (rep) T <sub>A</sub> = 100°C t <sub>p</sub> = 10μs 1.0% duty cycle Amp
		Min	Max	Max					Max	Min	
Alpha-Numerical Listings	Reference device number indicates specific Data Sheet on which device is characterized.										
Switching Voltage											
Switching Current											
Holding Current											
Forward On-State Voltage											
Forward Blocking Current											
Power Dissipation											
Reverse Voltage											
Pulse Peak Voltage											
Peak Recurrent Forward Current											

UNIDIRECTIONAL SWITCH

Type	Ref	V <sub>S</sub> Volts		I <sub>S</sub> μA	I <sub>H</sub> mA	V <sub>F</sub> I <sub>F</sub> = 150 mA	I <sub>B</sub> @ 50V μA	P <sub>D</sub> mW	V <sub>R</sub> Volts	V <sub>O</sub> Volts	I <sub>F</sub> (rep) T <sub>A</sub> = 100°C t <sub>p</sub> = 10μs 1.0% duty cycle Amp
		Min	Max	Max				Max	Min		
MUS4987	MUS4987	6.0	10	500	1.5	1.5	1.0	300	30	3.5	1.0
MUS4988	MUS4987	7.5	9.0	150	0.5	1.5	0.1	350	30	3.5	1.0



## FIELD-EFFECT TRANSISTORS

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered field-effect transistors.

### KEY

Type	Polarity	Const.	Ref.	$I_{DSS}$ Min mA Max mA *nA	$I_{GSS}$ $I_{DGO}^*$ nA	Breakdown Voltage $V_{(BR)}$ Sub- Volts script	$Y_{fs}$ Min $\mu$ hos Max $\mu$ hos	$C_{ISS}$ pF	NF @ f dB $\frac{\mu V^*}{\sqrt{Hz}}$ Units	NOTE: D = Dual MP = Matched Pair
Numerical Listing of Registered Type Numbers				Minimum and Maximum Drain Current with gate connected to source					Noise Figure in dB or *, $\mu V / \sqrt{Hz}$ at a specified frequency frequency units: H = Hz K = kHz M = MHz	
N = n-channel P = p-channel										
J = Junction FET M = MOS FET				Maximum Gate Current (leakage) with drain connected to source *Maximum leakage from drain to gate with source open					Maximum Input Capacitance	
Reference device number indicates specific Data Sheet on which device is characterized							Minimum and Maximum Forward Transadmittance			
Minimum Breakdown Voltage (Subscript defines conditions) GS = Gate to source, drain connection not specified GSS = Gate to source, drain connected to source GD = Gate to drain, source connection not specified GDS = Gate to drain, source connected to drain DGO = Drain to gate, source open DGS = Drain to gate, source connected to drain DS = Drain to source, gate connection not specified DSX = Drain to source, gate biased to cutoff or beyond										



# FIELD-EFFECT TRANSISTORS INDEX

Type	Polarity	Const.	IDSS		IGSS IDGO* nA	Breakdown Voltage		Yfs		Ciss pF	NF @ f		Note
			Min mA	Max mA *nA		V(BR) Volts	Sub- script	Min μmhos	Max μmhos		dB μV* √Hz	Units	
MFE120	N	M	2.0	18	20	25	DSX	8000	18,000	7.0	5.0	105 M	
MFE121	N	M	5.0	30	20	25	DSX	10,000	20,000	6.0	5.0	60 M	
MFE122	N	M	2.0	20	20	25	DSX	8000	18,000	7.0	5.0	200 M	
MFE2000	N	J	4.0	10	-200	-25	GSS	2500	6000	5.0	2.0	100 M	
MFE2001	N	J	8.0	20	-200	-25	GSS	4000	8000	5.0	2.0	100 M	
MFE2004	N	J	8.0		0.2	30	GSS			16			
MFE2005	N	J	15		0.2	30	GSS			16			
MFE2006	N	J	30		0.2	30	GSS			16			
MFE2007	N	J	8.0		2.0	25	GSS			30			
MFE2008	N	J	20		2.0	25	GSS			30			
MFE2009	N	J	50		2.0	25	GSS			30			
MFE2010	N	J	15		3.0	25	GSS			50			
MFE2011	N	J	40		3.0	25	GSS			50			
MFE2012	N	J	100		3.0	25	GSS			50			
MFE2093	N	J	0.1	0.7	-0.1	-50	GSS	250	500	6.0			
MFE2094	N	J	0.4	1.4	-0.1	-50	GSS	350	700	6.0			
MFE2095	N	J	1.0	3.0	-0.1	-50	GSS	400	800	6.0			
MFE3001	N	J	0.5	6.0	0.01	20	DSX	700	3500	5.0			
MFE3002	N	M		10*	0.1	15	DSS			5.0			
MFE3003	P	M		-10*	0.1	-15	DSS						
MFE3004	N	M	2.0	10	0.05	20	DSX	2000		4.5	4.5	200 M	
MFE3005	N	M	2.0	10	0.05	20	DSX	2000		4.5	4.5	400 M	
MFE3006	N	M	2.0	18	10	25	DSX	8000	18,000	6.0	4.0	100 M	
MFE3007	N	M	5.0	20	10	25	DSX	10,000	18,000	5.5	4.0	200 M	
MFE3008	N	M	2.0	20	10	25	DSX	8000	18,000	6.0			
MFE3020	P	M		10*	0.01	-25	DSS	500		7.0			
MFE3021	P	M		10*	0.01	-25	DSS	500		7.0			
MFE4007	P	J	0.5	1.0	2.0	40	GSS	900	2700	7.0	2.5	100 H	
MFE4008	P	J	0.8	1.6	2.0	40	GSS	1000	3000	7.0	2.5	100 H	
MFE4009	P	J	1.5	3.0	2.0	40	GSS	1500	3500	7.0	2.5	100 H	
MFE4010	P	J	2.5	5.0	2.0	40	GSS	2000	4000	7.0	2.5	100 H	Quad
MFE4011	P	J	4.0	8.0	2.0	40	GSS	2200	4500	7.0	2.5	100 H	
MFE4012	P	J	7.0	14	2.0	40	GSS	2500	5000	7.0	2.5	100 H	
MFE5000	P	M	1.0*	10*	1.0	25	DSS	2000	8000	6.0			
MMF1	N	J	0.5	10	0.05	30	GSS	1500	6500	6.0	2.5	100 H	
MMF2	N	J	0.5	10	0.05	30	GSS	1500	6500	6.0	2.5	100 H	
MMF3	N	J	0.5	10	0.05	30	GSS	1500	6500	6.0	2.5	100 H	
MMF4	N	J	0.5	10	0.05	30	GSS	1500	6500	6.0	2.5	100 H	
MMF5	N	J	0.5	10	0.05	30	GSS	1500	6500	6.0	2.5	100 H	
MMF6	N	J	0.5	10	0.05	30	GSS	1500	6500	6.0	2.5	100 H	
MMT3823	N	J	5.0	20	-1.0	-30	GSS	3000	8000	4.0	2.0	100 M	Dual Gate Dual Gate Dual Gate
MPF102	N	J	2.0	20	-2.0	-25	GSS	2000	7500	7.0			
MPF108	N	J	1.5	24	1.0	-25	GSS	2000	7500	6.5	2.5	1.0 K	
MPF109	N	J	0.5	24	-1.0	-25	GSS	800	1600	7.0	2.5	1.0 K	
MPF111	N	J	0.5	20	100	-20	GSS	500		4.5*			
MPF112	N	J	1.0	25	100	-25	GSS	1000	7500	8.0*			
MPF120	N	M	2.0	7.0	20	25	DSX	8000	18,000	7.0	5.0	105 M	
MPF121	N	M	5.0	10	20	25	DSX	10,000	20,000	6.0	5.0	60 M	
MPF122	N	M	2.0	9.0	20	25	DSX	8000	18,000	7.0	5.0	200 M	
MPF161	P	J	0.5	14	10	40	GSS	800	6000	7.0	2.5	1.0 K	
MPF256	N	J	3.0(1)	7.0(1)	5.0	25	GSS	6.0*	—	3.0	2.0		
MPF820	S	J	10		5.0	25	GSS	20* typ	15*	4.0			
MPF4391	N	J	60	130	1.0	30	GSS			10			
MPF4392	N	J	25	75	1.0	30	GSS			10			
MPF4393	N	J	5.0	30	1.0	30	GSS			10			

(1) 6.0/13 Green  
11/18 Violet



## WIDEBAND AMPLIFIER MODULES

The following table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered wideband amplifier modules.

Type	Ref.	NF dB Max	Output Level* dB/mV/N Channel	Frequency Range MHz	Gp dB Min	IMD dB Max	Z <sub>in</sub> and Z <sub>out</sub> @ Z <sub>0</sub> = 75 Ohms dB/Min	P <sub>D</sub> Watts Max
Alpha-Numerical Listing								
Reference device number indicates specific Data Sheet on which device is characterized								
Noise-Figure								
Output Level @ -57 dB Cross Modulation Distortion								
Frequency Range								
Power Gain								
Intermodulation Distortion								
Z <sub>in</sub> , Input Return Loss Z <sub>out</sub> , Output Return Loss								
Power Dissipation								

\* To NCTA Specification

## WIDEBAND AMPLIFIER MODULES

Type	Ref.	NF dB Max	Output Level* dB/mV/N Channel	Frequency Range MHz	Gp dB Min	IMD dB Max	Z <sub>in</sub> and Z <sub>out</sub> @ Z <sub>0</sub> = 75 Ohms dB/Min	P <sub>D</sub> Watts Max
MHW559	MHW559	7.5	47/21	40-300	15	-69	16	5.0
MHW560	MHW560	8.5	44/21	40-300	15	-62	16	5.0
MHW561	MHW561	12	47/21	40-300	15	-69	16	6.0
MHW562	MHW562	10	50/21	40-300	15	-69	16	6.0
MHW563	MHW563	10	51/12	3-120	15	-66	16	4.5



## UHF POWER MODULES

The following table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered UHF Power Modules.

Type	Ref.	P <sub>out</sub> Watts Min	Frequency Range MHz	Z <sub>in</sub> Z <sub>0</sub> = 50 Ohms Max	G <sub>p</sub> dB Min	η % Min
Alpha-Numerical Listing						
Reference device number indicates specific Data Sheet on which device is characterized						
Output Power						
Frequency Range						
Input VSWR						
Power Gain						
Efficiency						

Type	Ref.	P <sub>out</sub> Watts Min	Frequency Range Min	Z <sub>in</sub> Z <sub>0</sub> = 50 Ohms Max	G <sub>p</sub> dB Min	η % Min
MHW709	MHW709	7.5	400-470	2:1	18.8	35
MHW710	MHW710	13	400-470	2:1	19.4	35



## PROGRAMMABLE UNIJUNCTION TRANSISTORS – PUT

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered programmable unijunction transistors.

### KEY

Type	Ref.	I <sub>p</sub> Peak Current R <sub>G</sub> = 10 kΩ μA Max    R <sub>G</sub> = 1.0 MΩ μA Max		I <sub>GAO</sub> Leakage Current @ 40 V nA Max	I <sub>V</sub> Valley Current R <sub>G</sub> = 10 kΩ μA Min    R <sub>G</sub> = 1.0 MΩ μA Max		V <sub>GKF</sub> Gate to Cathode Forward Voltage Volts Max	P <sub>F</sub> mW	V <sub>O</sub> Min Output Voltage Volts	V <sub>F</sub> Forward Voltage V <sub>F</sub> @ I <sub>F</sub> Volts    mA		I <sub>T</sub> DC Anode Current mA Max	I <sub>T</sub> (pulse) Peak Anode Current 20 μs 1.0% DC Amp Max	T <sub>stg</sub> Storage Temp. Range °C
Alpha-numerical Listings														
Reference device number indicates specific data sheet on which device is characterized.														
Peak Current														
Gate to Anode Leakage Current														
Valley Current														
Gate to Cathode Forward Voltage														
Forward Power Dissipation @ 25°C														
Peak Output Voltage														
Forward Voltage														
DC Forward Anode Current														
Repetitive Peak Forward Current														
Storage Temperature Range														

## PROGRAMMABLE UNIJUNCTION TRANSISTORS – PUT

Type	Ref.	I <sub>p</sub> Peak Current R <sub>G</sub> = 10 kΩ μA Max    R <sub>G</sub> = 1.0 MΩ μA Max		I <sub>GAO</sub> Leakage Current @ 40 V nA Max	I <sub>V</sub> Valley Current R <sub>G</sub> = 10 kΩ μA Min    R <sub>G</sub> = 1.0 MΩ μA Max		V <sub>GKF</sub> Gate to Cathode Forward Voltage Volts Max	P <sub>F</sub> mW	V <sub>O</sub> Min Output Voltage Volts	V <sub>F</sub> Forward Voltage V <sub>F</sub> @ I <sub>F</sub> Volts    mA		I <sub>T</sub> DC Anode Current mA Max	I <sub>T</sub> (pulse) Peak Anode Current 20 μs 1.0% DC Amp Max	T <sub>stg</sub> Storage Temp. Range °C
MPU131	MPU131	5.0	2.0	5.0	70	50	40	375	6.0	1.5	50	200	2.0	-65 to +150
MPU132	MPU131	2.0	0.30	5.0	50	50	40	375	6.0	1.5	50	200	2.0	-65 to +150
MPU133	MPU131	1.0	0.15	5.0	50	25	40	375	6.0	1.5	50	200	2.0	-65 to +150
MPU231	2N6116	5.0	2.0	5.0	70	50	40	250	6.0	1.5	50	200	2.0	-65 to +200
MPU232	2N6116	2.0	0.30	5.0	50	50	40	250	6.0	1.5	50	200	2.0	-65 to +200
MPU233	2N6116	1.0	0.15	5.0	50	25	40	250	6.0	1.5	50	200	2.0	-65 to +200
MPU6027	MPU6027	5.0	2.0	10	70	50	40	375	6.0	1.5	50	200	5.0	-55 to +150
MPU6028	MPU6027	1.0	0.15	10	25	25	40	375	6.0	1.5	50	200	5.0	-55 to +150



# TRANSISTORS

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered transistors.

## KEY

Collector-Emitter Saturation  
Voltage at Specified  
Collector Current

Ic Units:  
A = Amp  
M = milliamp

TYPE	MATERIAL	POLARITY	REF.	USE	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS			
					P <sub>D</sub> @ 25°C	T <sub>J</sub> °C	V <sub>CEO</sub> (volts)	V <sub>CE</sub> - (volts)	h <sub>FE</sub> @ I <sub>C</sub> (min) (max)	V <sub>CE(SAT)</sub> @ I <sub>C</sub> (volts)	h <sub>FE</sub> - Subscript	f <sub>T</sub> - Units Subscript
Numerical Listing of 2N and 3N Registered Type Numbers									Common-Emitter DC Short- Circuit Forward-Current Transfer Ratio at Specified Collector Current Ic Units: A = Amp M = milliamp * = microamp N = nanoamp			
S = Silicon G = Germanium									Maximum Collector-Emitter Voltage (Subscript Identifies Condition)			
P = PNP N = NPN									Subscript: O = V <sub>CEO</sub> = Base Open R = V <sub>CER</sub> = Specified Resistance S = V <sub>CES</sub> = Base Shorted V = V <sub>CEV</sub> = Used when only voltage bias is used X = V <sub>CEX</sub> = Base-Emitter Back Biased U = V <sub>CE</sub> = Termination Undefined			
Reference device number indicates specific Data Sheet on which device is characterized									Small-Signal Forward-Current Transfer Ratio (E, B or C defines the parameter) E = h <sub>FE</sub> = Common-Emitter Current Transfer Ratio B = h <sub>FB</sub> = Common-Base Current Transfer Ratio C = h <sub>FC</sub> = Common-Collector Current Transfer Ratio			
<b>APPLICATION CODE</b> A = Amplifier AH = Amplifier, High frequency AHP = Amplifier, High frequency power AL = Amplifier, Light sensitive AM = Amplifier, Multiple device AP = Amplifier, Power AS = Amplifier Switch ASM = Amplifier Switch Multiple device S = Switch SC = Switch, Chopper SH = Switch, High speed SHP = Switch, High speed power SM = Switching Amplifier SP = Switch, Power									<b>CUTOFF FREQUENCY</b> Units: K = KHz M = MHz G = GHz (B, E, M or T Indicate the Parameter) B = f <sub>HB</sub> = f <sub>ab</sub> = Common-Base Cutoff Frequency E = f <sub>HE</sub> = f <sub>ae</sub> = Common-Emitter Cutoff Frequency M = f <sub>max</sub> = Maximum Frequency of Oscillations T = f <sub>r</sub> = Current Gain - Bandwidth Product			
Power Dissipation at 25°C Units: M = milliwatts W = Watts									Maximum Collector - Base Voltage			
Ref. Point: A, C, J, S, Indicates Ambient, Case, Junction or Stud									Maximum Operating Junction Temperature			



# TRANSISTOR INDEX

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS										
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>		Units	h <sub>f</sub>	Subscript	f— Units	Subscript	
											Min	Max		Volts	Volts						
BU105	S	N	MJ105	S	10W	C	115	750	750	R				5.0	2.5A					7.5M	T
MA100	G	P	MA100	A	200M	A	100	60	60	S	30		10M			50	E		1.0M	B	
MA200	G	P	MA200	A	150M	A	100	105	105	O	20		5.0M	0.35	5.0M				1.0M	B	
MA201	G	P	MA200	A	150M	A	100	105	105	O	20		5.0M	0.35	5.0M				1.0M	B	
MA202	G	P	MA200	A	150M	A	100	105	105	O	40		5.0M	0.35	5.0M				1.0M	B	
MA203	G	P	MA200	A	150M	A	100	105	105	O	40		5.0M	0.35	5.0M				1.0M	B	
MA204	G	P	MA200	A	150M	A	100	90	90	O	20		5.0M	0.35	5.0M				1.0M	B	
MA205	G	P	MA200	A	150M	A	100	75	75	O	20		5.0M	0.35	5.0M				1.0M	B	
MA206	G	P	MA200	A	150M	A	100	60	60	O	20		5.0M	0.35	5.0M				1.0M	B	
MA881	G	P	MA881	AS	200M	A	100	60	60	S	30		10M			30	E		0.75M	B	
MA882	G	P	MA881	AS	200M	A	100	60	60	S	40		10M			50	E		1.0M	B	
MA883	G	P	MA881	AS	200M	A	100	60	60	S	75		10M			100	E		1.25M	B	
MA884	G	P	MA881	AS	200M	A	100	60	60	S	125		10M			190	E		1.75M	B	
MA885	G	P	MA881	AS	200M	A	100	50	50	S						15	E		0.5M	B	
MA886	G	P	MA881	AS	200M	A	100	50	50	S						30	E		0.75M	B	
MA887	G	P	MA881	AS	200M	A	100	50	50	S						50	E		1.0M	B	
MA888	G	P	MA881	AS	200M	A	100	50	50	S						100	E		1.25M	B	
MA889	G	P	MA881	AS	200M	A	100	50	50	S						190	E		1.75M	B	
MA1702	G	P	MA1702	AS	200M	A	100	45	30	R	200		100M	0.26	200M	500	E		7.0M	B	
MA1703	G	P	MA1702	AS	200M	A	100	25	25	R	100	350	100M			200	E		3.0M	B	
MA1704	G	P	MA1702	AS	200M	A	100	25	25	R	150	400	100M			350	E		5.0M	B	
MA1705	G	P	MA1702	AS	200M	A	100	25	25	R	200		100M			500	E		6.0M	B	
MA1706	G	P	MA1702	AS	200M	A	100	15	15	R	100	350	100M			200	E		3.0M	B	
MA1707	G	P	MA1702	AS	200M	A	100	15	15	R	150	400	100M			350	E		4.0M	B	
MA1708	G	P	MA1702	AS	200M	A	100	15	15	R	200		100M			500	E		5.0M	B	
MD708	S	N	MD708	SM	400M	A	200	40	15	O	40	200	10M	0.2	10M				300M	T	
MD708A	S	N	MD708	SM	400M	A	200	40	15	O	40	200	10M	0.2	10M				300M	T	
MD708AF	S	N	MD708	SM	350M	A	200	40	15	O	40	200	10M	0.2	10M				300M	T	
MD708B	S	N	MD708	SM	400M	A	200	40	15	O	40	200	10M	0.2	10M				300M	T	
MD708BF	S	N	MD708	SM	350M	A	200	40	15	O	40	200	10M	0.2	10M				300M	T	
MD708F	S	N	MD708	SM	350M	A	200	40	15	O	40	200	10M	0.2	10M				300M	T	
MD918	S	N	MD918	AM	400M	A	200	30	15	O	50		1.0M	0.2	10M				600M	T	
MD918A	S	N	MD918	AM	400M	A	200	30	15	O	50		1.0M	0.2	10M				600M	T	
MD918AF	S	N	MD918	AM	350M	A	200	30	15	O	50		1.0M	0.2	10M				600M	T	
MD918B	S	N	MD918	AM	400M	A	200	30	15	O	50		1.0M	0.2	10M				600M	T	
MD918BF	S	N	MD918	AM	350M	A	200	30	15	O	50		1.0M	0.2	10M				600M	T	
MD918F	S	N	MD918	AM	350M	A	200	30	15	O	50		1.0M	0.2	10M				600M	T	
MD982	S	P	MD982	AM	0.6W	A	200	60	50	O	40		150M	0.5	150M				200M	T	
MD984	S	P	MD984	AS	3.0W	C	200	40	20	O	25		10M	0.3	10M	2.5	E		250M	T	
MD985	S	N/P	MD985	ASM	600M	A	200	60	30	O	25		10M	0.5	150M				200M	T	
MD985F	S	N/P	MD985	ASM	350M	A	200	60	30	O	25		10M	0.5	150M				200M	T	
MD986	S	N/P	MD986	ASM	350M	A	200	60	30	O	25		10M	0.5	150M				200M	T	
MD986F	S	N/P	MD986	ASM	350M	A	200	60	30	O	25		10M	0.5	150M				200M	T	
MD1120	S	N	MD1120	A	350M	A	200	60	30	O	50	200	10M	0.1	10M	2.5	E		250M	T	
MD1121	S	N	MD1120	A	600M	A	200	60	30	O	50	200	10M	0.1	10M	2.5	E		250M	T	
MD1122	S	N	MD1120	A	600M	A	200	60	30	O	50	200	10M	0.1	10M				250M	T	
MD1123	S	P	MD1123	AM	0.6W	A	200	60	40	O	50	200	10M	0.25	10M				200M	T	
MD1129	S	N	MD1129	AM	600M	A	200	60	30	O	100	300	100*	0.1	10M				200M	T	
MD1129F	S	N	MD1129	AM	350M	A	200	60	30	O	100	300	100*	0.1	10M				200M	T	



TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE</sub> (SAT) @ I <sub>C</sub>		Units	h <sub>FE</sub>	Subscript	f— Units	Subscript	
											Min	Max	Units	Volts						
MD1130	S	P	MD1130	AM	600M	A	200	60	40	0	100	300	100*	0.25	10M	6.0	E	200M	T	
MD1130F	S	P	MD1130	AM	350M	A	200	60	40	0	100	300	100*	0.25	10M			200M	T	
MD1132	S	N	MD1132	A	300M	A	200	30	15	0	50		1.0M	0.4	10M					
MD2218	S	N	MD2218	ASM	500M	A	200	60	30	0	40	120	150M	0.4	150M			200M	T	
MD2218A	S	N	MD2218	ASM	500M	A	200	75	40	0	40	120	150M	0.3	150M			200M	T	
MD2218AF	S	N	MD2218	ASM	250M	A	200	75	40	0	40	120	150M	0.3	150M			200M	T	
MD2218F	S	N	MD2218	ASM	250M	A	200	60	30	0	40	120	150M	0.4	150M			200M	T	
MD2219	S	N	MD2219	ASM	500M	A	200	60	30	0	100	300	150M	0.4	150M			250M	T	
MD2219A	S	N	MD2219	ASM	500M	A	200	75	40	0	100	300	150M	0.3	150M	250M	T			
MD2219AF	S	N	MD2219	ASM	250M	A	200	75	40	0	100	300	150M	0.3	150M	250M	T			
MD2219F	S	N	MD2219	ASM	250M	A	200	60	30	0	100	300	150M	0.4	150M			250M	T	
MD2369	S	N	MD2369	SM	500M	A	200	40	15	0	40	120	10M	0.25	10M			500M	T	
MD2369A	S	N	MD2369	SM	500M	A	200	40	15	0	40	120	10M	0.25	10M			500M	T	
MD2369AF	S	N	MD2369	SM	250M	A	200	40	15	0	40	120	10M	0.25	10M			500M	T	
MD2369B	S	N	MD2369	SM	500M	A	200	40	15	0	40	120	10M	0.25	10M			500M	T	
MD2904	S	P	MD2904	ASM	500M	A	200	60	40	0	40	120	150M	0.4	150M			200M	T	
MD2904A	S	P	MD2904	ASM	500M	A	200	60	60	0	40	120	150M	0.4	150M			200M	T	
MD2904AF	S	P	MD2904	ASM	250M	A	200	60	60	0	40	120	150M	0.4	150M			200M	T	
MD2904F	S	P	MD2904	ASM	250M	A	200	60	40	0	40	120	150M	0.4	150M			200M	T	
MD2905	S	P	MD2905	ASM	500M	A	200	60	40	0	100	300	150M	0.4	150M			200M	T	
MD2905A	S	P	MD2905	ASM	500M	A	200	60	60	0	100	300	150M	0.4	150M			200M	T	
MD2905AF	S	P	MD2905	ASM	250M	A	200	60	60	0	100	300	150M	0.4	150M			200M	T	
MD2905F	S	P	MD2905	ASM	250M	A	200	60	40	0	100	300	150M	0.4	150M			200M	T	
MD3250	S	P	MD3250	AM	500M	A	200	50	40	0	50	150	100*	0.25	150M	50	E	200M	T	
MD3250A	S	P	MD3250	AM	500M	A	200	50	40	0	50	150	100*	0.25	10M	50	E	200M	T	
MD3250AF	S	P	MD3250	AM	250M	A	200	50	40	0	50	150	100*	0.25	10M	50	E	200M	T	
MD3250F	S	P	MD3250	AM	250M	A	200	50	40	0	50	150	100*	0.25	10M	50	E	200M	T	
MD3251	S	P	MD3250	AM	500M	A	200	50	40	0	100	300	100*	0.25	10M	100	E	250M	T	
MD3251A	S	P	MD3250	AM	500M	A	200	50	40	0	100	300	100*	0.25	10M	100	E	250M	T	
MD3251AF	S	P	MD3250	AM	250M	A	200	50	40	0	100	300	100*	0.25	10M	100	E	250M	T	
MD3251F	S	P	MD3250	AM	250M	A	200	50	40	0	100	300	100*	0.25	10M	100	E	250M	T	
MD3409	S	N	MD3409	AM	0.6W	A	200	60	30	0	40	160	1.0M	0.15	10M	2.5	E			
MD3410	S	N	MD3409	AM	0.6W	A	200	60	30	0	40	160	1.0M	0.15	10M	2.5	E			
MD3467	S	P	MD3467	SM	500M	A	200	40	40	0	20		500M	0.5	500M			150M	T	
MD3467F	S	P	MD3467	SM	250M	A	200	40	40	0	20		500M	0.5	500M			150M	T	
MD3725	S	N	MD3725	SM	500M	A	200	65	40	0	50	150	100M	0.26	100M			250M	T	
MD3725F	S	N	MD3725	SM	250M	A	200	65	40	0	50	150	100M	0.26	100M			250M	T	
MD3762	S	P	MD3762	SM	500M	A	200	40	40	0	20		1.0A	1.0	1.0A			150M	T	
MD3762F	S	P	MD3762	SM	250M	A	200	40	40	0	20		1.0A	1.0	1.0A			150M	T	
MD4957	S	P	MD4957	AM	200M	A	200	30	30	0	20	150	2.0M			20	E	1.0G	T	
MD5000	S	P	MD5000	AM	300M	A	200	20	15	0	20		3.0M	0.4	10M			600M	T	
MD5000A	S	P	MD5000	AM	300M	A	200	20	15	0	20		3.0M	0.4	10M			600M	T	
MD5000B	S	P	MD5000	AM	300M	A	200	20	15	0	20		3.0M	0.4	10M			600M	T	
MD6001	S	N/P	MD6001	ASM	500M	A	200	60	30	0	40	120	150M	0.4	150M			200M	T	
MD6001F	S	N/P	MD6001	ASM	250M	A	200	60	30	0	40	120	150M	0.4	150M			200M	T	
MD6002	S	N/P	MD6001	ASM	500M	A	200	60	30	0	100	300	150M	0.4	150M			200M	T	
MD6002F	S	N/P	MD6001	ASM	250M	A	200	60	30	0	100	300	150M	0.4	150M			200M	T	
MD6003	S	N/P	MD6001	AM	500M	A	200	50	30	0	70		150M	0.4	150M			200M	T	
MD6003F	S	N/P	MD6001	AM	250M	A	200	50	30	0	70		150M	0.4	150M			200M	T	
MD6100	S	N/P	MD6100	AM	500M	A	200	60	45	0	100		100*	0.2	100*			30M	T	
MD8001	S	N	MD8001	AM	300M	A	200		40	0	100		1.0M							
MD8002	S	N	MD8001	AM	300M	A	200		50	0	100		1.0M							
MD8003	S	N	MD8001	AM	300M	A	200		60	0	100		1.0M							
MHQ2221	S	N	MHQ2221	ASM	0.65W	A	200	60	40	0	40		150M	0.4	150M			350M	T	
MHQ2222	S	N	MHQ2221	ASM	0.65W	A	200	60	40	0	100		150M	0.4	150M			350M	T	
MHQ2369	S	N	MHQ2369	ASM	0.5W	A	200	40	15	0	40		10M	0.25	10M			550M	T	
MHQ2483	S	N	MHQ2383	AM	0.6W	A	200	35	25	0	150		1.0M	0.35	1.0M			175M	T	
MHQ2484	S	N	MHQ2384	AM	0.6W	A	200	35	30	0	300		1.0M	0.35	10M			175M	T	
MHQ2906	S	P	MHQ2906	ASM	0.65W	A	200	60	40	0	40		150M	0.4	150M			350M	T	
MHQ2907	S	P	MHQ2907	ASM	0.65W	A	200	60	40	0	100		150M	0.4	150M			350M	T	



# TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>		Units	h <sub>f</sub> —	Subscript	f— Units	Subscript
											Min	Max		Volts	Volts					
MHQ3250	S	P	MHQ3250	ASM	0.6W	A	200	60	40	0	50	200	10M	0.25	10M				400M	T
MHQ3251A	S	P	MHQ3250	ASM	0.6W	A	200	60	60	0	100	300	10M	0.25	10M				400M	T
MHQ3467	S	P	MHQ3467	ASM	0.9W	C	200	40	40	0	20		500M	0.5	500M					
MHQ3546	S	P	MHQ3546	ASM	0.5W	A	200	15	12	0	30		10M	0.25	10M				1000M	T
MHQ3798	S	P	MHQ3798	AM	0.5W	A	200	60	40	0	150		100*	0.2	100*				325M	T
MHQ3799	S	P	MHQ3798	AM	0.5W	A	200	60	60	0	300		100*	0.2	100*				325M	T
MHQ6001	S	N/P	MHQ6001	ASM	0.65W	A	200	60	30	0	40		150M	0.4	150M				400M	T
MHQ6002	S	N/P	MHQ6001	ASM	0.65W	A	200	60	30	0	100		150M	0.4	150M				400M	T
MHQ6100	S	N/P	MHQ6100	AM	0.5W	A	200	60	40	0	75		1.0M	0.25	1.0M				175M	T
MHQ6100A	S	N/P	MHQ6100	AM	0.5W	A	200	60	50	0	150		1.0M	0.25	1.0M				175M	T
MJ105	S	N	MJ105	S	10W	C	115	750	750	R				5.0	2.5A				7.5M	T
MJ400	S	N	MJ400	AP	6.67W	C	175	350	325	0	30	300	50M	5.0	50M				15M	T
MJ410	S	N	MJ410	AP	*100W	C	150	200	200	0	30	90	1.0A	0.8	1.0A				2.5M	T
MJ411	S	N	MJ410	AP	*100W	C	150	300	300	0	30	90	1.0A	0.8	1.0A				2.5M	T
MJ413	S	N	MJ413	SP	125W	C	150	400	400	X	20	80	500M	0.8	500M				2.5M	T
MJ420	S	N	MJ420	AP	2.5W	C	175	275	250	0	25	250	30M	5.0	30M				15M	T
MJ421	S	N	MJ420	AP	2.5W	C	175	350	325	0	25	250	30M	5.0	30M				15M	T
MJ423	S	N	MJ413	SP	125W	C	150	400	400	X	30	90	1.0A	0.8	1.0A				2.5M	T
MJ424	S	N	MJ424	AP	*100W	C	150	700	350	0	30	90	1.0A	0.8	1.0A				2.5M	T
MJ425	S	N	MJ424	AP	*100W	C	150	700	400	0	30	90	1.0A	0.8	1.0A				2.5M	T
MJ431	S	N	MJ413	SP	125W	C	150	400	400	X	15	35	2.5A	0.7	2.5A				2.5M	T
MJ450	S	P	MJ450	ASP	150W	C	200	40	40	0	20		10A	1.0	10A				2.0M	T
MJ480	S	N	MJ480	AP	87.5W	C	200	40	40	0	30	200	1.0A	1.0	1.0A				4.0M	T
MJ481	S	N	MJ480	AP	87.5W	C	200	60	60	0	30	200	1.0A	1.0	1.0A				4.0M	T
MJ490	S	P	MJ490	AP	87.5W	C	200	40	40	0	30	200	1.0A	0.4	1.0A				4.0M	T
MJ491	S	P	MJ490	AP	87.5W	C	200	60	60	0	30	200	1.0A	0.4	1.0A				4.0M	T
MJ500	S	P	MJ500	ASP	60W	C	200	60	60	0	25	180	2.0A	0.7	2.0A				30M	T
MJ501	S	P	MJ500	ASP	60W	C	200	80	80	0	25	180	2.0A	0.7	2.0A				30M	T
MJ802	S	N	MJ802	AP	200W	C	200	100	100	R	25	100	7.5A	0.8	7.5A				2.0M	T
MJ900	S	P	MJ900	AP	90W	C	200	60	60	0	1000		3.0A	2.0	3.0A	1.0	E			
MJ901	S	P	MJ900	AP	90W	C	200	80	80	0	1000		3.0A	2.0	3.0A	1.0	E			
MJ920	S	P	MJ920	AP	120W	C	200	60	60	0	750	18,000	4.0A	2.0	4.0A	300	E		4.0M	T
MJ921	S	P	MJ920	AP	120W	C	200	80	80	0	750	18,000	4.0A	2.0	4.0A	300	E		4.0M	T
MJ1000	S	N	MJ900	AP	90W	C	200	60	60	0	1000		3.0A	2.0	3.0A	1.0	E			
MJ1001	S	N	MJ900	AP	90W	C	200	80	80	0	1000		3.0A	2.0	3.0A	1.0	E			
MJ1200	S	N	MJ920	AP	120W	C	200	60	60	0	750	18,000	4.0A	2.0	4.0A	300	E		4.0M	T
MJ1201	S	N	MJ920	AP	120W	C	200	80	80	0	750	18,000	4.0A	2.0	4.0A	300	E		4.0M	T
MJ1800	S	P	MJ1800	ASP	100W	C	150		250	0	40	120	400M							
MJ2249	S	P	MJ2249	ASP	20W	C	175	60	60	0	25	200	500M	1.0	500M				10M	T
MJ2250	S	P	MJ2249	ASP	20W	C	175	80	80	0	25	200	500M	1.0	500M				10M	T
MJ2251	S	N	MJ2250	AP	10W†	C	150		225	0	25	200	50M						10M	T
MJ2252	S	N	MJ2250	AP	10W†	C	150		300	0	25	200	50M						10M	T
MJ2253	S	P	MJ2253	ASP	25W	C	200	70	60	0	20	100	250M	0.3	500M				3.0M	T
MJ2254	S	P	MJ2253	ASP	25W	C	200	90	80	0	20	100	250M	0.3	500M				3.0M	T
MJ2267	S	P	MJ2267	ASP	150W	C	200	40	40	0	20	100	4.0A	1.0	4.0A				3.0M	T
MJ2268	S	P	MJ2267	ASP	150W	C	200	55	55	0	20	100	4.0A	1.0	4.0A				3.0M	T
MJ2500	S	P	MJ2500	AP	150W	C	200	60	60	0	1000		5.0A	2.0	5.0A					
MJ2501	S	P	MJ2500	AP	150W	C	200	80	80	0	1000		5.0A	2.0	5.0A					
MJ2801	S	N	MJ2801	ASP	115W	C	200	50	40	0	15	60	8.0A	1.5	8.0A				1.0M	T
MJ2840	S	N	MJ2840	AP	150W	C	200	60	60	0	20	100	3.0A						2.0M	T
MJ2841	S	N	MJ2840	AP	150W	C	200	80	80	0	20	100	4.0A						2.0M	T
MJ2901	S	P	MJ2901	ASP	115W	C	200	50	40	0	15	60	8.0A	1.5	8.0A				1.0M	T
MJ2940	S	P	MJ2940	AP	150W	C	200	60	60	0	20	100	3.0A						4.0M	T
MJ2941	S	P	MJ2940	AP	150W	C	200	80	80	0	20	100	4.0A						4.0M	T
MJ3000	S	N	MJ2500	AP	150W	C	200	60	60	0	1000		5.0A	2.0	5.0A					
MJ3001	S	N	MJ2500	AP	150W	C	200	80	80	0	1000		5.0A	2.0	5.0A					
MJ3026	S	N	MJ3026	AP	80W	C	150		275	0	25		250M							
MJ3027	S	N	MJ3026	AP	80W	C	150		300	0	25		250M							
MJ3028	S	N	MJ3208	AP	100W	C	150		300	0	25		0.3A							
MJ3029	S	N	MJ2029	AP	125W	C	150		250	0	25		0.3A	2.0	3.0A					
MJ3030	S	N	MJ2029	AP	125W	C	150		325	0	30		0.4A	2.0	3.0A					
MJ3040	S	N	MJ3040	AP	100W	C	150	400	300	0	100		2.5A	2.2	2.5A					

\*75°C



TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f— Units	Subscript		
											Min	Max	Units	Volts					Units	Units
MJ3041	S	N	MJ3040	AP	100W	C	150	400	300	0	250		2.5A	2.2	2.5A					
MJ3042	S	N	MJ3040	AP	100W	C	150	450	350	0	250		2.5A	2.2	2.5A					
MJ3101	S	N	MJ2249	ASP	20W	C	175	50	40	0	25	200	0.5A	1.0	500M			10M	T	
MJ3201	S	N	MJ3201	AP	15W	C	175	225	225	0	30	200	50M	5.0	50M			15M	T	
MJ3202	S	N	MJ3201	AP	15W	C	175	300	300	0	30	200	50M	5.0	50M			15M	T	
MJ3260	S	N	MJ3260	S	80W	C	150	700	750	R				6.0	5.5A			7.5M	T	
MJ3430	S	P	MJ3430	AP	125W	C	150	400	300	0	15	45	2.5A	0.9	2.5A			2.5M	T	
MJ3520	S	N	MJ3520	AP	150W	C	150	40	40	0	500		4.0A	2.5	4.0A	300	E	4.0K	T	
MJ3521	S	N	MJ3521	AP	150W	C	150	100	80	0	500		4.0A	1.8	4.0A	300	E	4.0K	T	
MJ3701	S	P	MJ3701	ASP	25W	C	200	50	40	0	20	100	250m	0.3	500M			3.0M	T	
MJ3771	S	N	2N6257	ASP	200W	C	200	50	50	X	15	60	15A	1.0	15A	40	E	4.0M	T	
MJ3772	S	N	2N6257	ASP	200W	C	200	100	80	X	15	60	15A	0.8	15A	40	E	4.0M	T	
MJ3773	S	N	2N6302	ASP	200W	C	200	160	160	X	15	60	8.0A	0.8	8.0A	40	E	1.0M	T	
MJ4000	S	N	MJ4000	AP	75W	C	200	60	60	0	1000		1.5A	2.0	1.5A					
MJ4001	S	N	MJ4000	AP	75W	C	200	80	80	0	1000		1.5A	2.0	1.5A					
MJ4010	S	P	MJ4000	AP	75W	C	200	60	60	0	1000		1.5A	2.0	1.5A					
MJ4011	S	P	MJ4000	AP	75W	C	200	80	80	0	1000		1.5A	2.0	1.5A					
MJ4030	S	P	MJ4030	AP	150W	C	200	60	60	0	1000		10A	2.5	10A					
MJ4031	S	P	MJ4030	AP	150W	C	200	80	80	0	1000		10A	2.5	10A					
MJ4032	S	P	MJ4030	AP	150W	C	200	100	100	0	1000		10A	2.5	10A					
MJ4033	S	N	MJ4030	AP	150W	C	200	60	60	0	1000		10A	2.5	10A					
MJ4034	S	N	MJ4030	AP	150W	C	200	80	80	0	1000		10A	2.5	10A					
MJ4035	S	N	MJ4030	ASP	150W	C	200	100	100	0	1000		10A	2.5	10A					
MJ4200	S	N	MJ4200	AP	60W	C	200	60	60	0	750	18,000	2.0A	2.0	2.0A	300	E	4.0M	T	
MJ4201	S	N	MJ4200	AP	60W	C	200	80	80	0	750	18,000	2.0A	2.0	2.0A	300	E	4.0M	T	
MJ4210	S	P	MJ4200	AP	60W	C	200	60	60	0	750	18,000	2.0A	2.0	2.0A	300	E	4.0M	T	
MJ4211	S	P	MJ4200	AP	60W	C	200	80	80	0	750	18,000	2.0A	2.0	2.0A	300	E	4.0M	T	
MJ4502	S	P	MJ4502	AP	200W	C	200	100	100	R	25	100	7.5A	0.8	7.5A			2.0M	T	
MJ4645	S	P	MJ4645	AP	5.0W	C	200	200	200	0	20		500M	1.0	500M			40M	T	
MJ4646	S	P	MJ4645	AP	5.0W	C	200	300	300	0	20		500M	1.2	500M			40M	T	
MJ4647	S	P	MJ4645	AP	5.0W	C	200	400	400	0	20		500M	1.5	500M			30M	T	
MJ4648	S	P	MJ4645	AP	5.0W	C	200	350	350	0	20		500M	1.5	500M			30M	T	
MJ6257	S	N	2N6257	ASP	200W	C	200	50	50	X	15	75	15A	0.7	15A	40	E	4.0M	T	
MJ6302	S	N	2N6302	ASP	200W	C	200	160	160	X	15	60	8.0A	0.8	8.0A	40	E	1.0M	T	
MJ6700	S	P	MJ6700	AP	60W	C	200	60	60	0	25	180	2.0A	0.7	2.0A			30M	T	
MJ6701	S	P	MJ6701	ASP	60W	C	200	80	80	0	25	180	2.0A	0.7	2.0A			30M	T	
MJ7000	S	N	MJ7000	ASP	150W	C	200	100	100	0	20	100	10A	1.0	10A			30M	T	
MJ7200	S	N	MJ7200	ASP	300W	C	200	100	80	0	20	100	20A	1.0	20A			20M	T	
MJ7201	S	N	MJ7200	ASP	300W	C	200	120	100	0	20	100	20A	1.0	20A			20M	T	
MJ8100	S	P	MJ8100	ASP	10W	C	200	60	60	0	25	180	2.0A	0.7	2.0A			30M	T	
MJ8101	S	P	MJ8100	ASP	10W	C	200	80	80	0	25	180	2.0A	0.7	2.0A			30M	T	
MJ8400	S	N	MJ8400	AP	125W	C	150		600	0				2.0	3.0A					
MJ9000	S	N	MJ9000	AP	125W	C	150		325	0				2.0	6.0A					
MJE105	S	P	MJE105	AP	65W	C	150	50	50	0	25	100	2.0A							
MJE170	S	P	MJE170	AS	12.5W	C	150	60	40	0	50	250	100M	0.3	500M			50M	T	
MJE171	S	P	MJE170	AS	12.5W	C	150	80	60	0	50	250	100M	0.3	500M			50M	T	
MJE172	S	P	MJE170	AS	12.5W	C	150	100	80	0	50	250	100M	0.3	500M			50M	T	
MJE180	S	N	MJE170	AS	12.5W	C	150	60	40	0	50	250	100M	0.3	500M			50M	T	
MJE181	S	N	MJE170	AS	12.5W	C	150	80	60	0	50	250	100M	0.3	500M			50M	T	
MJE182	S	N	MJE170	AS	12.5W	C	150	100	80	0	50	250	100M	0.3	500M			50M	T	
MJE200	S	N	MJE200	A	15W	C	150	40	25	0	45	180	2.0A	0.75	2.0A					
MJE205	S	N	MJE205	AP	65W	C	150	50	50	0	25	100	2.0A							
MJE210	S	P	MJE200	A	15W	C	150	40	25	0	45	180	2.0A	0.75	2.0A			65M	T	
MJE220	S	N	MJE220	AS	15W	C	150	60	40	0	40	200	200M	0.3	500M			50M	T	
MJE221	S	N	MJE220	AS	15W	C	150	60	40	0	40	150	200M	0.3	500M			50M	T	
MJE222	S	N	MJE220	AS	15W	C	150	60	40	0	25		200M	0.3	500M			50M	T	
MJE223	S	N	MJE220	AS	15W	C	150	80	60	0	40	200	200M	0.3	500M			50M	T	
MJE224	S	N	MJE220	AS	15W	C	150	80	60	0	40	200	200M	0.3	500M			50M	T	
MJE225	S	N	MJE220	AS	15W	C	150	80	60	0	25		200M	0.3	500M			50M	T	
MJE230	S	P	MJE220	AS	15W	C	150	60	40	0	40	200	200M	0.3	500M			50M	T	
MJE231	S	P	MJE220	AS	15W	C	150	60	40	0	40	150	200M	0.3	500M			50M	T	



# TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref.	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f— Units	Subscript	
											Min	Max		Volts						
MJE232	S	P	MJE220	AS	15W	C	150	60	40	0	25		200M	0.3	500M				50M	T
MJE233	S	P	MJE220	AS	15W	C	150	80	60	0	40	200	200M	0.3	500M				50M	T
MJE234	S	P	MJE220	AS	15W	C	150	80	60	0	40	150	200M	0.3	500M				50M	T
MJE235	S	P	MJE220	AS	15W	C	150	80	60	0	25		200M	0.3	500M				50M	T
MJE240	S	N	MJE240	AS	15W	C	150	80	80	0	40	200	200M	0.3	500M				40M	T
MJE241	S	N	MJE240	AS	15W	C	150	80	80	0	40	120	200M	0.3	500M				40M	T
MJE242	S	N	MJE240	AS	15W	C	150	80	80	0	25		200M	0.3	500M				40M	T
MJE243	S	N	MJE240	AS	15W	C	150	100	100	0	40	120	200M	0.3	500M				40M	T
MJE244	S	N	MJE240	AS	15W	C	150	100	100	0	25		200M	0.3	500M				40M	T
MJE250	S	P	MJE240	AS	15W	C	150	80	80	0	40	200	200M	0.3	500M				40M	T
MJE251	S	P	MJE240	AS	15W	C	150	80	80	0	40	120	200M	0.3	500M				40M	T
MJE252	S	P	MJE240	AS	15W	C	150	80	80	0	25		200M	0.3	500M				40M	T
MJE253	S	P	MJE240	AS	15W	C	150	100	100	0	40	120	200M	0.3	500M				40M	T
MJE254	S	P	MJE240	AS	15W	C	150	100	100	0	25		200M	0.3	500M				40M	T
MJE340	S	N	MJE340	AP	20.8W	C	150		300	0	30	240	50M							
MJE341	S	N	MJE341	AP	20.8W	C	150	175	150	0	25	200	50M	1.0	150M	25	E	15M	T	
MJE344	S	N	MJE341	AP	20.8W	C	150	200	200	0	30	300	50M	1.0	150M	25	E	15M	T	
MJE350	S	P	MJE350	S	20W	C	150		300	0	30	240	50M							
MJE370	S	P	MJE370	AP	25W	C	150	30	30	0	25		1.0A							
MJE371	S	P	MJE371	AP	40W	C	150	40	40	0	40		1.0A							
MJE520	S	N	MJE520	AP	25W	C	150	30	30	0	25		1.0A							
MJE521	S	N	MJE521	AP	40W	C	150	40	40	0	40		1.0A							
MJE700	S	P	MJE700	AP	40W	C	125	60	60	0	750		1.5A	2.5	1.5A	1.0	E			
MJE701	S	P	MJE700	AP	40W	C	125	60	60	0	750		2.0A	2.8	2.0A	1.0	E			
MJE702	S	P	MJE700	AP	40W	C	125	80	80	0	750		1.5A	2.5	1.5A	1.0	E			
MJE703	S	P	MJE700	AP	40W	C	125	80	80	0	750		2.0A	2.8	2.0A	1.0	E			
MJE710	S	P	MJE710	APS	1.25W	A	150	40	40	0	40		150M	0.15	150M					
MJE711	S	P	MJE710	APS	1.25W	A	150	60	60	0	40		150M	0.15	150M					
MJE712	S	P	MJE710	APS	1.25W	A	150	80	80	0	40		150M	0.15	150M					
MJE720	S	N	MJE720	APS	1.25W	A	150	40	40	0	40		150M	0.15	150M					
MJE721	S	N	MJE720	APS	1.25W	A	150	60	60	0	40		150M	0.15	150M					
MJE722	S	N	MJE720	APS	1.25W	A	150	80	80	0	40		150M	0.15	150M					
MJE800	S	N	MJE700	AP	40W	C	125	60	60	0	750		1.5A	2.5	1.5A	1.0	E			
MJE801	S	N	MJE700	AP	40W	C	125	60	60	0	750		2.0A	2.8	2.0A	1.0	E			
MJE802	S	N	MJE700	AP	40W	C	125	80	80	0	750		1.5A	2.5	1.5A	1.0	E			
MJE803	S	N	MJE700	AP	40W	C	125	80	80	0	750		2.0A	2.8	2.0A	1.0	E			
MJE1090	S	P	MJE1090	AP	70W	C	150	60	60	0	750		3.0A	2.5	3.0A	1.0	E			
MJE1091	S	P	MJE1090	AP	70W	C	150	60	60	0	750		4.0A	2.8	4.0A	1.0	E			
MJE1092	S	P	MJE1090	AP	70W	C	150	80	80	0	750		3.0A	2.5	3.0A	1.0	E			
MJE1093	S	P	MJE1090	AP	70W	C	150	80	80	0	750		4.0A	2.8	4.0A	1.0	E			
MJE1100	S	N	MJE1090	AP	70W	C	150	60	60	0	750		3.0A	2.5	3.0A	1.0	E			
MJE1101	S	N	MJE1090	AP	70W	C	150	60	60	0	750		4.0A	2.8	4.0A	1.0	E			
MJE1102	S	N	MJE1090	AP	70W	C	150	80	80	0	750		3.0A	2.5	3.0A	1.0	E			
MJE1103	S	N	MJE1090	AP	70W	C	150	80	80	0	750		4.0A	2.8	4.0A	1.0	E			
MJE1290	S	P	MJE1290	ASP	90W	C	150	40	40	0	20	100	5.0A	1.8	15A	25	E	3.0M	T	
MJE1291	S	P	MJE1290	ASP	90W	C	150	60	60	0	20	100	5.0A	1.8	15A	25	E	3.0M	T	
MJE1660	S	N	MJE1290	ASP	90W	C	150	40	40	0	20	100	5.0A	1.8	15A	25	E	3.0M	T	
MJE1661	S	N	MJE1290	ASP	90W	C	150	60	60	0	20	100	5.0A	1.8	15A	25	E	3.0M	T	
MJE2010	S	P	MJE2010	ASP	80W	C	150	40	40	0	25	125	1.0A	1.0	3.5A	20	E	3.0M	T	
MJE2011	S	P	MJE2010	ASP	80W	C	150	60	60	0	25	125	1.0A	1.0	3.5A	20	E	3.0M	T	
MJE2020	S	N	MJE2010	ASP	80W	C	150	40	40	0	25	125	1.0A	1.0	3.5A	20	E	3.0M	T	
MJE2021	S	N	MJE2010	ASP	80W	C	150	60	60	0	25	125	1.0A	1.0	3.5A	20	E	3.0M	T	
MJE2090	S	P	MJE1090	AP	70W	C	150	60	60	0	750		3.0M	2.5	3.0M	1.0	E			
MJE2091	S	P	MJE1090	AP	70W	C	150	60	60	0	750		4.0M	2.8	4.0M	1.0	E			
MJE2092	S	P	MJE1090	AP	70W	C	150	80	80	0	750		3.0M	2.5	3.0M	1.0	E			
MJE2093	S	P	MJE1090	AP	70W	C	150	80	80	0	750		4.0M	2.8	4.0M	1.0	E			
MJE2100	S	N	MJE1090	AP	70W	C	150	60	60	0	750		3.0M	2.5	3.0M	1.0	E			
MJE2101	S	N	MJE1090	AP	70W	C	150	60	60	0	750		4.0M	2.8	4.0M	1.0	E			
MJE2102	S	N	MJE1090	AP	70W	C	150	80	80	0	750		3.0M	2.5	3.0M	1.0	E			
MJE2103	S	N	MJE1090	AP	70W	C	150	80	80	0	750		4.0M	2.8	4.0M	1.0	E			



TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>			V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>fe</sub>	Subscript	f— Units	Subscript	
											Min	Max	Units	Volts	Units					
MJE2160	S	N	MJE2160	A	50W	C	150		300	0	30	240	500M							
MJE2360	S	N	MJE2360	AP	30W	C	150	375	350	0	25	200	50M	1.5	100M			10M	T	
MJE2361	S	N	MJE2360	AP	30W	C	150	375	350	0	50	250	50M	1.5	100M			10M	T	
MJE2370	S	P	MJE2370	ASP	40W	C	150	40	40	0	40	200	0.2A	0.7	1.0A	20	E	3.0M	T	
MJE2371	S	P	MJE2370	ASP	40W	C	150	60	60	0	40	200	0.2A	0.7	1.0A	20	E	3.0M	T	
MJE2480	S	N	MJE2480	ASP	60W	C	150	40	40	0	20	100	1.5A	0.7	1.5A			2.0M	T	
MJE2481	S	N	MJE2480	ASP	60W	C	150	60	60	0	20	100	1.5A	0.7	1.5A			2.0M	T	
MJE2482	S	N	MJE2480	ASP	60W	C	150	40	40	0	20	100	2.5A	0.7	1.5A			2.0M	T	
MJE2483	S	N	MJE2480	ASP	60W	C	150	60	60	0	20	100	2.5A	0.7	1.5A			2.0M	T	
MJE2490	S	P	MJE2490	ASP	60W	C	150	40	40	0	20	100	1.0A	0.6	1.0A	20	E	3.0M	T	
MJE2491	S	P	MJE2490	ASP	60W	C	150	60	60	0	20	100	1.0A	0.6	1.0A	20	E	3.0M	T	
MJE2520	S	N	MJE2520	ASP	40W	C	150	40	40	0	10		1.0A	0.7	1.0A	20	E	3.0M	T	
MJE2521	S	N	MJE2520	ASP	40W	C	150	60	60	0	10		1.0A	0.7	1.0A	20	E	3.0M	T	
MJE2522	S	N	MJE2520	ASP	40W	C	150	40	40	0	20	100	1.0A	0.6	1.0A	20	E	3.0M	T	
MJE2523	S	N	MJE2520	ASP	40W	C	150	60	60	0	20	100	1.0A	0.6	1.0A	20	E	3.0M	T	
MJE2801	S	N	MJE2801	AP	90W	C	150	60	60	0	25	100	3.0A							
MJE2901	S	P	MJE2901	AP	90W	C	150	60	60	0	25	100	3.0A							
MJE2955	S	P	MJE2955	ASP	90W	C	150	70	60	0	20	70	4.0A	1.1	4.0A			2.0M	T	
MJE3054	S	N	MJE3054	ASP	40W	C	150	90	55	0	25	100	0.5A	1.0	0.5A	25	E	30K	E	
MJE3055	S	N	MJE3055	ASP	90W	C	150	70	60	0	20	70	4.0A	1.1	4.0A			2.0M	T	
MJE3370	S	P	MJE3370	AP	25W	C	150	30	30	0	25		1.0A							
MJE3371	S	P	MJE3371	AP	40W	C	150	40	40	0	40		1.0A							
MJE3439	S	N	MJE3439	AP	15W	C	150	450	350	0	40	160	20M	0.5	50M	25	E	15M	T	
MJE3440	S	N	MJE3439	AP	15W	C	150	350	250	0	40	160	20M	0.5	50M	25	E	15M	T	
MJE3520	S	N	MJE3520	AP	25W	C	150	30	30	0	25		1.0A							
MJE3521	S	N	MJE3520	AP	40W	C	150	40	40	0	40		1.0A							
MJE3738	S	N	MJE3738	AP	30W	C	150	250	225	0	40	200	100M	2.5	250M			10M	T	
MJE3739	S	N	MJE3739	AP	30W	C	150	325	300	0	40	200	100M	2.5	250M			10M	T	
MJE3740	S	P	MJE3740	SP	40W	C	150	60	60	0	30	100	250M	0.6	1.0A			4.0M	T	
MJE3741	S	P	MJE3740	SP	40W	C	150	80	80	0	30	100	250M	0.6	1.0A			4.0M	T	
MM869B	S	P	2N869A	S	360M	A	200	30	30	0	40	120	10M	0.15	10M			400M	T	
MM1500,A	S	N	MM1500,A	AH	3.5W	C	200	30	15	0								1500M	T	
MM1501,A	S	N	MM1500,A	AH	3.5W	C	200	30	15	0								1500M	T	
MM1553	S	N	MM1552	AHP	80W	C	200	100	70	0	15		2.0A						T	
MM1748	S	N	MM1748	S	300M	A	200	15	6.0	0	20	120	10M	0.3	3.0M	100	E	600M	T	
MM1893	S	N	MM1893	AS	1.0W	A	200	120	80	0	40	120	150M	5.0	150M			50M	T	
MM1941	S	N	MM1942	AH	300M	A	175	30	30	S	25		10M					600M	T	
MM2193A	S	N	MM2193A	AS	1.0W	A	200	80	50	0	40	120	150M	0.25	150M	2.5	E		T	
MM2258	S	N	MM2258	AH	1.0W	A	200	120	120	0	50		10M	0.4	25M			150M	T	
MM2259	S	N	MM2258	AH	1.0W	A	200	175	175	0	35		10M	0.4	25M			150M	T	
MM2260	S	N	MM2258	AH	1.0W	A	200	175	175	0	50		10M	0.4	25M			150M	T	
MM2270	S	N	MM2270	AS	1.0W	A	200	60	45	0	30	200	150M	0.9	150M	50	E	100M	T	
MM2484	S	N	A	1.2W	C	200	60	60	0	250		1.0M			3.0	E				
MM2894A	S	P	MM2894	SH	360M	A	200	12	12	0	40	120	30M	0.19	30M			800M	T	
MM3000	S	N	MM3000	AH	1.0W	A	200	100	0	20			10M					150M	T	
MM3001	S	N	MM3000	AH	1.0W	A	200	150	0	20			10M					150M	T	
MM3002	S	N	MM3000	AH	1.0W	A	200	200	0	20			10M					150M	T	
MM3003	S	N	MM3000	AH	1.0W	A	200	250	0	20			10M					150M	T	
MM3004	S	N	MM3005	AH	1.0W	A	200	25	0	70			150M					50M	T	
MM3005	S	N	MM3005	AS	1.0W	A	200	80	60	0	50	250	150M	0.35	150M			50M	T	
MM3006	S	N	MM3005	AS	1.0W	A	200	100	80	0	50	250	200M	0.35	150M			50M	T	
MM3007	S	N	MM3005	AS	1.0W	A	200	120	100	0	50	250	250M	0.35	150M			50M	T	
MM3008	S	N	MM3008	AH	1.0W	A	200	120	120	0	30		1.0M					50M	T	
MM3009	S	N	MM3008	AH	1.0W	A	200	180	180	0	30		1.0M					50M	T	
MM3019	S	N	MM3019	AS	1.0W	A	200	140	80	0	100	300	150M	0.2	150M	80	E	80M	T	
MM3020	S	N	MM3019	AS	1.0W	A	200	140	80	0	40	120	150M	0.2	150M	30	E	80M	T	
MM3053	S	N	MM3019	AS	1.0W	A	200	80	50	0	40	300	150M	0.6	150M			100M	T	
MM3726	S	P	MM3726	SH	1.0W	C	200	50	50	0	30	120	500M	0.6	150M			200M	T	
MM3736	S	N	MM3736	AS	2.0W	C	200	50	30	0	30	120	1.0A	0.9	1.0A			200M	T	
MM3737	S	N	MM3736	AS	2.0W	C	200	75	50	0	20	80	1.0A	0.9	1.0A			200M	T	
MM3903	S	N	MM3903	AS	360M	A	200	60	40	0	50	150	10M	0.2	10M	50	E	250M	T	



TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE</sub> (SAT) @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f— Units	Subscript		
											Min	Max	Units	Volts					Units	
MM3904	S	N	MM3903	AS	360M	A	200	60	40	0	100	300	10M	0.2	10M	100	E	300M	T	
MM3905	S	P	MM3905	AS	360M	A	200	40	40	0	50	150	10M	0.25	10M	50	E	200M	T	
MM3906	S	P	MM3905	AS	360M	A	200	40	40	0	100	300	10M	0.25	10M	100	E	250M	T	
MM4000	S	P	MM4000	AH	600M	A	200	100	100	0	20		10M	0.6	10M					
MM4001	S	P	MM4000	AH	1.0W	A	200	150	150	0	20		10M	0.6	10M					
MM4002	S	P	MM4000	AH	1.0W	A	200	200	200	0	20		10M	5.0	10M					
MM4003	S	P	MM4000	AH	1.0W	A	200	250	250	0	20		10M	5.0	10M					
MM4005	S	P	MM4005	AH	1.0W	A	200	60	60	0	40		1.0M					50M	T	
MM4006	S	P	MM4005	AH	1.0W	A	200	80	80	0	40		1.0M					50M	T	
MM4007	S	P	MM4005	AH	1.0W	A	200	100	100	0	40		1.0M					50M	T	
MM4008	S	P	MM4008	AH	1.0W	A	200	60	60	0	75		10M							
MM4009	S	P	MM4008	AH	1.0W	A	200	80	80	0	75		10M							
MM4010	S	P	MM4008	AH	1.0W	A	200	100	100	0	75		10M							
MM4018	S	P	MM4018	AH	5.0W	C	200	40	20	0	10		50M					900M	T	
MM4019	S	P	MM4019	AH	5.0W	C	100	60	40	0	10		250M					750M	T	
MM4049	S	P	MM4049	AH	200M	A	200	15	10	0	20	80	25M					4.0G	T	
MM4052	S	P	MM4052	SC	0.5W	A	200	30	30	0	20		10M			20	E	12M	T	
MM4208	S	P	MM4208	SH	360M	A	200	12	12	0	30	120	10M	0.18	10M			850M	T	
MM4208A	S	P	MM4208	SH	360M	A	200	15	15	0	30	120	10M	0.18	10M			850M	T	
MM4209	S	P	MM4208	SH	360M	A	200	12	12	0	50	120	10M	0.18	10M			850M	T	
MM4209A	S	P	MM4208	SH	360M	A	200	15	15	0	50	120	10M	0.18	10M			850M	T	
MM4261H	S	P	MM4261H	S	200M	A	200	15	15	0	30	150	10M	0.5	10M			2.0G	T	
MM5000	G	P	MM5000	AH	150M	A	100	30	15	0	30		3.0M					800M	T	
MM5001	G	P	MM5000	AH	150M	A	100	30	15	0	30		3.0M					800M	T	
MM5005	S	P	MM5005	SAH	1.5W	A	200	80	60	0	50	250	150M	0.5	150M			30M	T	
MM5006	S	P	MM5005	SAH	1.5W	A	200	100	80	0	50	250	200M	0.5	150M			30M	T	
MM5007	S	P	MM5005	SAH	1.5W	A	200	120	100	0	50	250	250M	0.5	150M			30M	T	
MM8000	S	N	MM8000	AH	3.5W	C	200	40	30	0	30		50M					700M	T	
MM8001	S	N	MM8000	AH	3.5W	C	200	40	30	0	30		50M					900M	T	
MM8003	S	N	MM8003	AH	5.0W	C	200	40	30	0	30		50M					1200M	T	
MM8006	S	N	MM8006	AH	200M	A	200	15	10	0	25		1.0M	0.35	80M			1000M	T	
MM8007	S	N	MM8006	AH	200M	A	200	15	10	0	25		1.0M	0.35	80M			1000M	T	
MM8008	S	N	MM8008	A	3.5W	C	200	35	30	0				0.3	100M			1100M	T	
MM8009	S	N	MM8009	AH	3.5W	C	200	55	50	0				0.5	100M			1000M	T	
MM8010	S	N	MM8008	A	3.5W	C	200	35	30	0				0.3	100M			1100M	T	
MM8011	S	N	MM8008	A	3.5W	C	200	35	30	0				0.3	100M			1100M	T	
MMCM918	S	N	MMCM918	A	200M	A	200	30	15	0	20		3.0M	0.4	10M			600M	T	
MMCM930	S	N	MMCM930	A	200M	A	200	60	45	0	150		1.0M	0.35	1.0M			60M	T	
MMCM2222	S	N	MMCM2222	SAH	200M	A	200	60	30	0	100	300	150M	0.4	150M			200M	T	
MMCM2369	S	N	MMCM2369	SH	200M	A	200	40	15	0	40	120	10M	0.25	10M			500M	T	
MMCM2484	S	N	MMCM2484	A	200M	A	200	60	60	0	250		1.0M	0.35	1.0M			60M	T	
MMCM2907	S	P	MMCM2907	SAH	200M	A	200	60	40	0	100	300	150M	0.4	150M			200M	T	
MMT70	S	N	MMT70	A	225M	A	135	25	20	0	150		2.0M							
MMT71	S	P	MMT71	A	225M	A	135	25	20	0	150		2.0M							
MMT72	S	N	MMT72	SH	225M	A	135		10	0	30		10M					400M	T	
MMT73	S	P	MMT73	SH	225M	A	135		8.0	0	30		10M	0.2	10M			400M	T	
MMT74	S	N	MMT74	A	225M	A	135	20	12	0	25		3.0M					700M	T	
MMT75	S	P	MMT75	SAH	225M	A	135	30	20	0	50	400	10M							
MMT76	S	N	MMT75	SAH	225M	A	135	30	20	0	50	400	10M							
MMT806	S	N	MMT806	SH	225M	A	135	8.0	5.0	0	50		100*	0.1	100*			1200M	T	
MMT807	S	N	MMT807	AH	225M	A	135	8.0	5.0	0	25		1.0M	0.125	1.0M			1200M	T	
MMT808	S	P	MMT808	SH	225M	A	135	8.0	5.0	0	50		100*	0.1	100*			1200M	T	
MMT809	S	P	MMT809	AH	225M	A	135	8.0	5.0	0	25		1.0M	0.125	1.0M			1200M	T	
MMT918	S	N	MMCM918	A	225M	A	135	30	15	0	20		3.0M	0.4	10M			600M	T	
MMT930	S	N	MMCM930	A	225M	A	135	60	45	0	150		1.0M	0.35	1.0M			60M	T	
MMT2222	S	N	MMCM2222	SH	225M	A	135	60	30	0	100	300	150M	0.4	150M			200M	T	
MMT2369	S	N	MMCM2369	SH	225M	A	135	40	15	0	40	120	10M	0.25	10M			500M	T	
MMT2484	S	N	MMCM2484	A	225M	A	135	60	60	0	250		1.0M	0.35	1.0M			60M	T	
MMT2857	S	N	MMCM2857	A	225M	A	135	30	15	0	30		3.0M					1000M	T	
MMT2907	S	P	MMT2907	SAH	225M	A	135	60	40	0	100	300	150M	0.4	150M			200M	T	
MMT3014	S	N	MMT3014	SH	225M	A	135	40	20	0	50	200	30M	0.22	30M			350M	T	
MMT3546	S	P	MMT3546	SH	225M	A	135	15	12	0	30		10M	0.15	10M			700M	T	



TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25° C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>		f—		Subscript	
											Min	Max	Units	Volts	Units	Units	Units	Units	Units	Units
MMT3798	S	P	MMT3798	A	225M	A	135	60	60	0	150		1.0M	0.25	1.0M	275	E	40M	T	
MMT3799	S	P	MMT3798	A	225M	A	135	60	60	0	300		1.0M	0.25	1.0M	475	E	40M	T	
MMT3903	S	N	MMT3903	SAH	225M	A	135	60	40	0	50	150	10M	0.2	10M	100	E	250M	T	
MMT3904	S	N	MMT3903	SAH	225M	A	135	60	40	0	100	300	10M	0.2	10M	200	E	300M	T	
MMT3905	S	P	MMT3905	SAH	225M	A	135	40	40	0	50	150	10M	0.25	10M	100	E	200M	T	
MMT3906	S	P	MMT3905	SAH	225M	A	135	40	40	0	100	300	10M	0.25	10M	200	E	250M	T	
MMT3960	S	N	MMT3960	SH	225M	A	135	5.0	3.0	0	100	200	10M	0.2	10M			1600M	T	
MMT3960A	S	N	MMT3960A	SH	225M	A	135	15	8.0	0	30	200	10M	0.2	10M			1600M	T	
MMT8015	S	N	MMT8015	A	200M	A	135	15	10	0	25	300	1.0M	0.35	10M			1000M	T	
MP110	G	P	MP110	AP	106W	C	110		65	X	74	250	1.0A	0.5	2.0A			320k	T	
MP110B	G	P	MP110B	AP	106W	C	110	90	40	0	55		5.0A	0.5	5.0A			500k	T	
MP500	G	P	MP500	AP	170W	C	110	45	30	0	30	60	15A	0.2	15A			2.0k	E	
MP500A	G	P	MP500	AP	170W	C	110	45	30	0	30	60	15A	0.2	15A			2.0k	E	
MP501	G	P	MP500	AP	170W	C	110	60	45	0	30	60	15A	0.2	15A			2.0k	E	
MP501A	G	P	MP500	AP	170W	C	110	60	45	0	30	60	15A	0.2	15A			2.0k	E	
MP502	G	P	MP500	AP	170W	C	110	70	60	0	30	60	15A	0.2	15A			2.0k	E	
MP502A	G	P	MP500	AP	170W	C	110	70	60	0	30	60	15A	0.2	15A			2.0k	E	
MP504	G	P	MP500	AP	170W	C	110	45	30	0	50	100	15A	0.2	15A			2.0k	E	
MP504A	G	P	MP500	AP	170W	C	110	45	30	0	50	100	15A	0.2	15A			2.0k	E	
MP505	G	P	MP500	AP	170W	C	110	60	45	0	50	100	15A	0.2	15A			2.0k	E	
MP505A	G	P	MP500	AP	170W	C	110	60	45	0	50	100	15A	0.2	15A			2.0k	E	
MP506	G	P	MP500	AP	170W	C	110	70	60	0	50	100	15A	0.2	15A			2.0k	E	
MP506A	G	P	MP500	AP	170W	C	110	70	60	0	50	100	15A	0.2	15A			2.0k	E	
MP525	G	P	MP525	AP	106W	C	110		60	X	30	150	3.0A							
MP600	G	P	MP600	SP	85W	C	110	75	50	0	50		5.0A	0.75	25A					
MP601	G	P	MP600	SP	85W	C	110	75	60	0	50		5.0A	0.75	25A					
MP602	G	P	MP600	SP	85W	C	110	90	70	0	50		5.0A	0.75	25A					
MP603	G	P	MP600	SP	85W	C	110	90	80	0	50		5.0A	0.75	25A					
MP800	G	P	MP800	AP	250W	C	110		60	0	15		150A	0.3	150A					
MP801	G	P	MP800	AP	250W	C	110		45	0	15		150A	0.3	150A					
MP900	G	P	MP900	SP	250W	C	110	80	60	0	20		70A	0.5	150A					
MP901	G	P	MP900	SP	250W	C	110	110	90	0	20		70A	0.5	150A					
MP902	G	P	MP900	SP	250W	C	110	140	120	0	20		70A	0.5	150A					
MP1612	G	P	MP1612	AP	85W	C	110	100	100	0	25	100	10A	0.3	10A					
MP1612A	G	P	MP1612	AP	85W	C	110	140	140	0	25	100	10A	0.3	10A					
MP1612B	G	P	MP1612	AP	85W	C	110	160	160	0	25	100	10A	0.3	10A					
MP1613	G	P	MP1613	AP	85W	C	110	100	75	0	40		1.0A	0.25	3.0A					
MP2000A	G	P	MP2000A	SP	106W	C	110		30	0	25		8.0A	0.6	25A			210k	T	
MP2060	G	P	MP2060	AP	85W	C	110	40	25	0	30	200	3.0A	0.25	3.0A			600k	T	
MP2061	G	P	MP2060	AP	85W	C	110	60	35	0	30	200	3.0A	0.25	3.0A			600k	T	
MP2062	G	P	MP2060	AP	85W	C	110	75	50	0	30	200	3.0A	0.25	3.0A			600k	T	
MP2063	G	P	MP2060	AP	85W	C	110	90	60	0	30	200	3.0A	0.25	3.0A			600k	T	
MP2100A	G	P	MP2000A	SP	106W	C	110		60	0	25		8.0A	0.6	25A			210k	T	
MP2200A	G	P	MP2000A	SP	106W	C	110		80	0	25		8.0A	0.6	25A			210k	T	
MP2300A	G	P	MP2000A	SP	106W	C	110		100	0	25		8.0A	0.6	25A			210k	T	
MP2400A	G	P	MP2000A	SP	106W	C	110		120	0	25		8.0A	0.6	25A			210k	T	
MP3730	G	P	MP3730	AP	56W	C	110	200	200	S	10	200	50M	0.5	50M			1.0M	T	
MP3731	G	P	MP3730	AP	56W	C	110	320	320	S	10	200	50M	0.5	50M			1.0M	T	
MPM5006	S	N	MPM5006	A	310M	A	135	40	40	0	30		4.0M	2.0	10M	4.0	E			
MPQ2221	S	N	MH02221	ASM	0.65W	A	200	60	40	0	40		150M	0.4	150M			200M	T	
MPQ2222	S	N	MH02221	ASM	0.65W	A	200	60	40	0	100		150M	0.4	150M			200M	T	
MPQ2369	S	N	MH02369	ASM	0.5W	A	200	40	15	0	40		10M	0.25	10M			450M	T	
MPQ2483	S	N	MPQ2483	AM	625M	A	150	60	40	0	150		1.0M	0.35	1.0M			50M	T	
MPQ2484	S	N	MPQ2483	AM	625M	A	150	60	40	0	300		1.0M	0.35	1.0M			50M	T	
MPQ2906	S	P	MH02906	ASM	0.65W	A	200	60	40	0	40		150M	0.4	150M			200M	T	
MPQ2907	S	P	MH02906	ASM	0.65W	A	200	60	40	0	100		150M	0.4	150M			200M	T	
MPQ3303	S	N	MPQ3303	ASM	2.5W	A	150	25	12	0	40	200	300M	0.33	300M			400M	T	
MPQ3467	S	P	MPQ3467	ASM	650M	A	150	40	40	0	20		500M	0.5	500M			125M	T	
MPQ3546	S	P	MH03546	ASM	0.5W	A	200	15	12	0	30		10M	0.25	10M			600M	T	
MPQ3725	S	N	MPQ3725	SM	2.5W	A	150		40	0	35	200	100M	0.45	500M			250M	T	
MPQ3798	S	P	MPQ3798	AM	625M	A	150	60	40	0	150		0.1M	0.2	0.1M			60M	T	
MPQ3799	S	P	MPQ3798	AM	625M	A	150	60	60	0	300		0.1M	0.2	0.1M			60M	T	



# TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		h <sub>FE</sub>	Subscript	f— Units	Subscript		
											Min	Max	Units	Volts					Units	
MPQ6001	S	N/P	MPQ6001	ASM	625M	A	150	60	30	0	40		150M	0.4	150M			200M	T	
MPQ6002	S	N/P	MPQ6001	ASM	625M	A	150	60	30	0	100		150M	0.4	150M			200M	T	
MPS404	S	P	MPS404	S	310M	A	135	25	24	0	30	400	12M	0.15	12M			4.0M	B	
MPS404A	S	P	MPS404	S	310M	A	135	40	35	0	30	400	12M	0.15	12M			4.0M	B	
MPS706	S	N	MPS706	SH	310M	A	135	25	20	R	20		10M	0.6	10M			200M	T	
MPS706A	S	N	MPS706	SH	310M	A	135	25	20	R	20	60	10M	0.6	10M			200M	T	
MPS834	S	N	MPS834	SH	310M	A	135	40	30	S	25		10M	0.25	10M			350M	T	
MPS918	S	N	MPS918	A	310M	A	135	30	15	0	20		3.0M	0.4	10M			600M	T	
MPS2369	S	N	MPS2369	SH	310M	A	135	40	15	0	40	120	10M	0.25	10M			500M	T	
MPS2711	S	N	MPS2711	A	310M	A	135	18	18	0	30	90	2.0M			30E			T	
MPS2712	S	N	MPS2711	A	310M	A	135	18	18	0	75	225	2.0M				80E			
MPS2713	S	N	MPS2713	S	310M	A	135	18	18	0	30	90	2.0M	0.3	50M	30	E	250M	T	
MPS2714	S	N	MPS2713	S	310M	A	135	18	18	0	75	225	2.0M	0.3	50M	80	E	250M	T	
MPS2923	S	N	MPS2923	AS	200M	A	150	25	25	0							90E			
MPS2924	S	N	MPS2923	AS	200M	A	150	25	25	0							150E			
MPS2925	S	N	MPS2923	AS	200M	A	150	25	25	0							235E			
MPS2926	S	N	MPS2926	AS	310M	A	150	18	18	0							35E	300M	T	
MPS3392	S	N	MPS3392	A	310M	A	150	25	25	0	150	300	2.0M				150E			
MPS3393	S	N	MPS3392	A	310M	A	150	25	25	0	90	180	2.0M				90E			
MPS3394	S	N	MPS3392	A	310M	A	150	25	25	0	55	110	2.0M				55E			
MPS3395	S	N	MPS3392	A	310M	A	150	25	25	0	150	500	2.0M				150E			
MPS3563	S	N	MPS918	AH	310M	A	135	30	12	0	20	200	8.0M	0.4	10M	20	E	600M	T	
MPS3638	S	P	MPS3638	SAH	310M	A	135	25	25	0	30		50M	0.25	50M	25	E	100M	T	
MPS3638A	S	P	MPS3638	SAH	310M	A	135	25	25	0	100		50M	0.25	50M	100	E	150M	T	
MPS3639	S	P	MPS3639	S	200M	A	150	6.0	6.0	0	30	120	10M	0.16	10M					
MPS3640	S	P	MPS3640	S	310M	A	135	12	12	0	30	120	10M	0.2	10M			500M	T	
MPS3646	S	N	MPS3646	SH	200M	A	125	40	15	0	30	120	30M	0.2	30M			350M	T	
MPS3693	S	N	MPS3693	AH	310M	A	135	45	45	0	40	160	10M					200M	T	
MPS3694	S	N	MPS3694	AH	310M	A	135	45	45	0	100	400	10M					200M	T	
MPS3702	S	P	MPS3702	AH	310M	A	135	40	25	0	60	300	50M	0.25	50M			100M	T	
MPS3703	S	P	MPS3702	AH	310M	A	135	50	30	0	30	150	50M	0.25	50M			100M	T	
MPS3704	S	N	MPS3704	AH	310M	A	135	50	30	0	100	300	50M	0.6	100M			100M	T	
MPS3705	S	N	MPS3704	AH	310M	A	135	50	30	0	50	150	50M	0.8	100M			100M	T	
MPS3706	S	N	MPS3704	AH	310M	A	135	40	20	0	30	600	50M	1.0	100M			100M	T	
MPS3707	S	N	MPS3707	A	310M	A	150	30	30	0	100	400	0.1M	1.0	10M	100E				
MPS3708	S	N	MPS3707	A	310M	A	150	30	30	0	45	660	1.0M	1.0	10M	45E				
MPS3709	S	N	MPS3707	A	310M	A	150	30	30	0	45	165	1.0M	1.0	10M	45E				
MPS3710	S	N	MPS3707	A	310M	A	150	30	30	0	90	330	1.0M	1.0	10M	90E				
MPS3711	S	N	MPS3707	A	310M	A	150	30	30	0	180	660	1.0M	1.0	10M	180E				
MPS3721	S	N	MPS2926	AS	310M	A	150	18	18	0						60E				
MPS4354	S	P	MPS4354	APS	625M	A	150	60	60	0	50	500	10M	0.15	150M	200	E	100M	T	
MPS4355	S	P	MPS4354	APS	625M	A	150	60	60	0	100	400	10M	0.15	150M	200	E	100M	T	
MPS4356	S	P	MPS4354	APS	625M	A	150	80	80	0	50	250	10M	0.15	150M	200	E	100M	T	
MPS5172	S	N	MPS5172	AH	210M	A	135	25	25	0	100	500	10M	0.25	10M			120M	T	
MPS6507	S	N	MPS6507	A	210M	A	135	30	20	0	25		2.0M					880M	T	
MPS6511	S	N	MPS6511	AH	310M	A	135	30	20	0	25		10M							
MPS6512	S	N	MPS6512	AH	310M	A	135	40	30	0	50	100	2.0M	0.5	50M			250M	T	
MPS6513	S	N	MPS6512	AH	310M	A	135	40	30	0	90	180	2.0M	0.5	50M			250M	T	
MPS6514	S	N	MPS6512	AH	310M	A	135	40	25	0	150	300	2.0M	0.5	50M			390M	T	
MPS6515	S	N	MPS6512	AH	310M	A	135	40	25	0	250	500	2.0M	0.5	50M			390M	T	
MPS6516	S	P	MPS6516	AH	310M	A	135	40	40	0	50	100	2.0M	0.5	50M			200M	T	
MPS6517	S	P	MPS6516	AH	310M	A	135	40	40	0	90	180	2.0M	0.5	50M			200M	T	
MPS6518	S	P	MPS6516	AH	310M	A	135	40	40	0	150	300	2.0M	0.5	50M			340M	T	
MPS6519	S	P	MPS6516	AH	310M	A	135	25	25	0	250	500	2.0M	0.5	50M			340M	T	
MPS6520	S	N	MPS6520	AH	310M	A	135	40	25	0	200	400	2.0M	0.5	50M			390M	T	
MPS6521	S	N	MPS6520	AH	310M	A	135	40	25	0	300	600	2.0M	0.5	50M			480M	T	
MPS6522	S	P	MPS6520	AH	310M	A	135	25	25	0	200	400	2.0M	0.5	50M			340M	T	
MPS6523	S	P	MPS6520	AH	310M	A	135	25	25	0	300	600	2.0M	0.5	50M			420M	T	
MPS6530	S	N	MPS6530	AH	310M	A	135	60	40	0	40	120	100M	0.5	100M			390M	T	
MPS6531	S	N	MPS6530	AH	310M	A	135	60	40	0	90	270	100M	0.3	100M			390M	T	
MPS6532	S	N	MPS6530	AH	310M	A	135	50	30	0	30		100M	0.5	100M			390M	T	
MPS6533	S	P	MPS6530	AH	310M	A	150	40	40	0	40	120	100M	0.5	100M			260M	T	



TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25°C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub>	V <sub>CB</sub>	V <sub>CE</sub>	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		Units	V <sub>CE(SAT)</sub> @ I <sub>C</sub>		Units	h <sub>FE</sub>	Subscript	f— Units	Subscript
						°C	Volts	Volts	Volts		Min	Max		Volts	Volts					
MPS6534	S	P	MPS6530	AH	310M	A	135	40	40	0	90	270	100M	0.3	100M				260M	T
MPS6535	S	P	MPS6530	AH	310M	A	135	30	30	0	30		100M	0.5	100M				260M	T
MPS6539	S	N	MPS6539	AH	310M	A	135	20	20	0	20		4.0M						500M	T
MPS6540	S	N	MPS6540	AH	310M	A	135	30	30	0	25		2.0M	0.5	10M				350M	T
MPS6542	S	N	MPS6542	AH	310M	A	135	30	20	0	25		2.0M						700M	T
MPS6543	S	N	MPS6543	AH	310M	A	135	35	25	0	25		4.0M	0.35	10M				750M	T
MPS6544	S	N	MPS6544	AH	310M	A	135	60	45	0	20		30M	0.5	30M					T
MPS6545	S	N	MPS6544	AH	310M	A	135	60	45	S	20		30M	0.5	30M					T
MPS6546	S	N	MPS6546	A	310M	A	135	35	25	0	20		2.0M	0.35	10M				600M	T
MPS6547	S	N	MPS6546	A	310M	A	135	35	25	0	20		2.0M	0.35	10M				600M	T
MPS6548	S	N	MPS6548	A	310M	A	135	30	25	0	25		4.0M	0.5	4.0M				650M	T
MPS6560	S	N	MPS6560	AH	500M	A	135	25	25	0	50	200	500M	0.5	500M				60M	T
MPS6561	S	N	MPS6560	AH	500M	A	135	20	20	0	50	200	350M	0.5	350M				60M	T
MPS6562	S	P	MPS6560	AH	500M	A	135	25	25	0	50	200	500M	0.5	500M				60M	T
MPS6563	S	P	MPS6560	AH	500M	A	135	20	20	0	50	200	350M	0.5	350M				60M	T
MPS6565	S	N	MPS6565	AH	310M	A	135	60	45	0	40	160	10M	0.4	10M	160	E		200M	T
MPS6566	S	N	MPS6565	AH	310M	A	135	60	45	0	100	400	10M	0.4	10M	160	E		200M	T
MPS6567	S	N	MPS6567	AH	310M	A	135		40	0	25		10M	0.5	10M					T
MPS6568	S	N	MPS6568	AH	310M	A	135	20	20	0	20	200	4.0M	3.0	10M				375M	T
MPS6568A	S	N	MPS6568	AH	310M	A	135	20	20	0	20	200	4.0M	3.0	10M				375M	T
MPS6569	S	N	MPS6568	AH	310M	A	135	20	20	0	20	200	4.0M	3.0	10M				300M	T
MPS6570	S	N	MPS6568	AH	310M	A	135	20	20	0	20	200	4.0M	3.0	10M				300M	T
MPS6571	S	N	MPS6571	AH	310M	A	135	20	20	0	250	1000	100*	0.5	10M				50M	T
MPS6573	S	N	MPS6573	AH	310M	A	135	35	35	0	200	500	10M	0.5	10M				200M	T
MPS6574	S	N	MPS6573	AH	310M	A	135	35	35	0	100	300	1.0M	0.5	10M				200M	T
MPS6575	S	N	MPS6573	AH	310M	A	135	45	45	0	200	500	10M	0.5	10M				200M	T
MPS6576	S	N	MPS6573	AH	310M	A	135	45	45	0	100	300	1.0M	0.5	10M				200M	T
MPS6590	S	N	MPS6590	A	310M	A	135	100	80	0	40		10M	0.6	10M		2.0E			T
MPS6591	S	N	MPS6590	A	310M	A	135	60	50	0	40		10M	0.6	10M		2.0E			T
MPS-A05	S	N	MPS-A05	AH	500M	A	135	60	60	0	50		100M	0.25	100M				50M	T
MPS-A06	S	N	MPS-A05	AH	500M	A	135	80	80	0	50		100M	0.25	100M				50M	T
MPS-A09	S	N	MPS-A09	AH	310M	A	135	50	50	0	100	600	0.1M	0.9	10M				30M	T
MPS-A12	S	N	MPS-A12	AH	310M	A	135		20	0	20,000		10M	1.0	10M					T
MPS-A13	S	N	MPS-A13	AH	500M	A	135	30	30	0	10,000		100M	1.5	100M		35	E	125M	T
MPS-A14	S	N	MPS-A13	AH	500M	A	135	30	30	0	20,000		100M	1.5	100M				125M	T
MPS-A16	S	N	MPS-A16	SH	350M	A	150		40	0	200	600	5.0M	0.25	10M				100M	T
MPS-A17	S	N	MPS-A16	SH	350M	A	150		40	0	200	600	5.0M	0.25	10M				100M	T
MPS-A18	S	N	MPS-A18	SH	310M	A	135	45	45	0	800		1.0M	0.1	10M				100M	T
MPS-A20	S	N	MPS-A20	AH	300M	A	135		40	0	40	400	5.0M	0.25	10M				125M	T
MPS-A42	S	N	MPS-A42	AH	625M	A	150	300	300	0	40		30M	0.5	20M				50M	T
MPS-A43	S	N	MPS-A42	AH	625M	A	150	200	200	0	50	200	30M	0.4	20M				50M	T
MPS-A55	S	P	MPS-A55	A	500M	A	135	60	60	0	50	125	100M	0.25	100M				50M	T
MPS-A56	S	P	MPS-A56	A	500M	A	135	80	80	0	50	125	100M	0.25	100M				50M	T
MPS-A65	S	P	MPS-A65	AH	500M	A	135	30	30	0	20,000		100M	1.5	100M				100M	T
MPS-A66	S	P	MPS-A65	AH	500M	A	135	30	30	0	40,000		100M	1.5	100M				100M	T
MPS-A70	S	P	MPS-A70	AH	300M	A	135		40	0	40	400	5.0M	0.25	10M				125M	T
MPS-A92	S	P	MPS-A92	AH	625M	A	150	300	300	0	25		30M	0.5	20M				50M	T
MPS-A93	S	P	MPS-A92	AH	625M	A	150	200	200	0	30	150	30M	0.4	20M				50M	T
MPS-H02	S	N	MPS-H02	AH	500M	A	135	20	20	0	20	200	4.0M						375M	T
MPS-H04	S	N	MPS-H04	AH	300M	A	135		80	0	30	120	1.5M	0.25	10M				80M	T
MPS-H05	S	N	MPS-H05	AH	300M	A	135		80	0	30	150	1.5M	0.25	10M				80M	T
MPS-H07	S	N	MPS-H07	AH	500M	A	135	30	30	0	20		3.0M						400M	T
MPS-H08	S	N	MPS-H07	AH	500M	A	135	30	30	0	20		3.0M						500M	T
MPS-H10	S	N	MPS-H10	AH	310M	A	135	30	25	0	60		4.0M	0.5	4.0M				650M	T
MPS-H11	S	N	MPS-H10	AH	310M	A	135	30	25	0	60		4.0M	0.5	4.0M				650M	T
MPS-H17	S	N	MPS-H17	A	625M	A	150	20	15	0	25	250	5.0M	0.5	10M		30	E	800M	T
MPS-H19	S	N	MPS-H19	AH	310M	A	135	30	25	0	45		4.0M						300M	T
MPS-H20	S	N	MPS-H20	AH	310M	A	135	40	30	0	25		4.0M						400M	T
MPS-H24	S	N	MPS-H24	AH	500M	A	135	40	30	0	30		8.0M						400M	T
MPS-H30	S	N	MPS-H30	AH	310M	A	135	20	20	0	20	200	4.0M		10M				300M	T
MPS-H31	S	N	MPS-H30	AH	310M	A	135	20	20	0	20	200	4.0M	3.0	10M				300M	T
MPS-H32	S	N	MPS-H32	AH	500M	A	135	40	40	0	27	200	4.0M	30	10M				300M	T



# TRANSISTOR INDEX (continued)

Type	MATERIAL	POLARITY	Ref.	Use	P <sub>D</sub> @ 25° C	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						Ref. Point	T <sub>J</sub> °C	V <sub>CB</sub> Volts	V <sub>CE</sub> — Volts	Subscript	h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(SAT)</sub> @ I <sub>C</sub>		Units	h <sub>FE</sub>	Subscript	f— Units	Subscript	
											Min	Max	Volts	Volts						
MPS-H34	S	N	MPS-H34	AH	500M	A	135	45	45	0	15		20M	0.5	20M			500M	T	
MPS-H37	S	N	MPS-H37	AH	310M	A	135		40	0	25		5.0M	0.5	10M			300M	T	
MPS-H54	S	P	MPS-H54	AH	300M	A	135		80	0	30	120	1.5M	0.25	10M			80M	T	
MPS-H55	S	P	MPS-H54	AH	300M	A	135		80	0	30	150	1.5M	0.25	10M			80M	T	
MPS-H81	S	P	MPS-H81	AH	350M	A	150	20	20	0	60		5.0M	0.5	5.0M			600M	T	
MPS-H83	S	P	MPS-H83	AH	1.0W	A	150	300	300	0	40		30M	0.75	30M			60M	T	
MPS-H85	S	P	MPS-H85	A	310M	A	150	30	30	0	20		2.5M					350M	T	
MPS-K20	S	N	MPS-A20	AH	300M	A	135		40	0	40	300	5.0M	0.25	10M			125M	T	
MPS-K21	S	N	MPS-A20	AH	300M	A	135		40	0	40	300	5.0M	0.25	10M			125M	T	
MPS-K22	S	N	MPS-A20	AH	300M	A	135		40	0	40	300	5.0M	0.25	10M			125M	T	
MPS-K70	S	P	MPS-A70	AH	300M	A	135		40	0	40	300	5.0M	0.25	10M			125M	T	
MPS-K71	S	P	MPS-A70	AH	300M	A	135		40	0	40	300	5.0M	0.25	10M			125M	T	
MPS-K72	S	P	MPS-A70	AH	300M	A	135		40	0	40	300	5.0M	0.25	10M			125M	T	
MPS-L01	S	N	MPS-L01	AH	310M	A	135	140	120	0	50	300	10M	0.2	10M			60M	T	
MPS-L51	S	P	MPS-L51	AH	310M	A	135	100	100	0	40	250	50M	0.3	50M			60M	T	
MPS-U01	S	N	MPS-U01	AH	1.0W	A	135	40	30	0	50		1.0A	0.5	1.0A			50M	T	
MPS-U01A	S	N	MPS-U01	AH	1.0W	A	135	50	40	0	50		1.0A	0.5	1.0A			50M	T	
MPS-U02	S	N	MPS-U02	AH	1.0W	A	135	60	40	0	50	300	150M	0.4	150M			150M	T	
MPS-U03	S	N	MPS-U03	AH	1.0W	A	135	120	120	0	40		10M	0.5	200M			100M	T	
MPS-U04	S	N	MPS-U03	AH	1.0W	A	135	180	180	0	40		10M	0.5	200M			100M	T	
MPS-U05	S	N	MPS-U05	AH	1.0W	A	135	60	60	0	60		250M	0.4	250M			50M	T	
MPS-U06	S	N	MPS-U05	AH	1.0W	A	135	80	80	0	60		250M	0.4	250M			50M	T	
MPS-U07	S	N	MPS-U07	AH	1.0W	A	135	100	100	0	30		250M	0.4	250M			50M	T	
MPS-U10	S	N	MPS-U10	AH	1.0W	A	150	300	300	0	40		10M	0.75	30M			60M	T	
MPS-U45	S	N	MPS-U45	AH	1.0W	A	150	50	40	0	25,000	150,000	200M	1.5	1.0A			100M	T	
MPS-U51	S	P	MPS-U51	AH	1.0W	A	135	40	30	0	50		1.0A	0.7	1.0A			50M	T	
MPS-U51A	S	P	MPS-U51	AH	1.0W	A	135	50	40	0	50		1.0A	0.7	1.0A			50M	T	
MPS-U52	S	P	MPS-U52	AH	1.0W	A	135	60	40	0	50	300	150M	0.4	150M			150M	T	
MPS-U55	S	P	MPS-U55	AH	1.0W	A	150	60	60	0	50		250M	0.5	200M			50M	T	
MPS-U56	S	P	MPS-U55	AH	1.0W	A	150	80	80	0	50		250M	0.5	250M			50M	T	
MPS-U57	S	P	MPS-U57	AH	1.0W	A	150	100	100	0	30		5.0M	0.5	250M			50M	T	
MPS-U60	S	P	MPS-U60	AH	10W	A	150	300	300	0	25		1.0M	0.75	20M			60M	T	
MPS-U95	S	P	MPS-U95	AH	1.0W	A	150	50	40	0	4,000		1.0A	1.5	1.0A			320M	T	
MQ2218	S	N	MD2218	SAM	400M	A	200	60	30	0	40	120	150M	0.4	150M			200M	T	
MQ2219A	S	N	MD2219	ASM	400M	A	200	75	40	0	20	100	300	150M	0.3	150M			250M	T
MQ2904	S	P	MD2904	ASM	400M	A	200	60	40	0	40	120	150M	0.4	150M			200M	T	
MQ2905A	S	P	MD2905	ASM	400M	A	200	60	60	0	100	300	150M	0.4	150M			200M	T	
MQ3467	S	P	MD3467	SM	400M	A	200	40	40	0	20		500M	0.5	500M			150M	T	
MQ3725	S	N	MD3725	ASM	400M	A	200	65	40	0	50	150	100M	0.26	100M			250M	T	
MQ3799	S	P	MD3799	AM	250M	A	200	60	60	0	300	900	100*	0.2	100*	500	E	100M	T	
MRF207	S	N	MRF207	AP	3.5W	C		36	18	0	5.0		100M							
MRF208	S	N	MRF207	AP	37.5W	C		36	18	0	5.0		250M							
MRF209	S	N	MRF207	AP	50W	C		36	18	0	5.0		500M							
MRF501	S	N	MRF501	AH	200M	A		25	15	0	30	250	1.0M					1000M	T	
MRF502	S	N	MRF501	AH	200M	A		35	15	0	40	170	1.0M					1200M	T	
MRF618	S	N	MRF618	AP	45W	C		36	18	0	30	200	1.0A							
MRF5177	S	N	MRF5177	AP	58W	C		60	35	0	10	100	100M							
MRF8004	S	N	MRF8004	AH	5.0W	C		60	30	0	10		400M							



## UNIUNCTION TRANSISTORS

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non registered unijunction transistors.

### KEY

Type	Ref.	P <sub>D</sub> mW	R <sub>BB</sub> kΩ		η		I <sub>V</sub> Min mA	I <sub>p</sub> Max μA	I <sub>EO</sub> @ V <sub>EB2</sub> μA @ M max	V <sub>EB1</sub> (sat) V @ 50 mA
Numerical Listing of Registered Type Numbers			Interbase Resistance							
			Intrinsic Standoff Ratio							
			Valley Current							
			Peak Point Current							
Reference device number indicates specific Data Sheet on which device is characterized			Emitter Reverse Current at indicated V <sub>B2E</sub>							
Power Dissipation @ 25°C			Emitter Saturation Voltage							

### UNIUNCTION TRANSISTORS INDEX

Type	Ref.	P <sub>D</sub> mW	R <sub>BB</sub> kΩ		$\eta$		I <sub>V</sub> Min mA	I <sub>p</sub> Max μA	I <sub>EO</sub> @ V <sub>EB2</sub> μA @ V Max	V <sub>EB1</sub> (sat) V @ 50 mA
MU10	MU10	300	4.0	10	0.50	0.85	1.0	5.0	1.0 @ 30	2.0
MU20	MU10	300	4.7	9.1	0.56	0.85	1.0	2.0	0.2 @ 30	2.0
MU851	MU851	200	4.7	9.1	0.56	0.75	2.0	2.0	0.1 @ 30	2.5
MU852	MU851	200	4.7	9.1	0.70	0.85	4.0	2.0	0.1 @ 30	2.5
MU853	MU851	200	4.7	9.1	0.70	0.85	4.0	0.4	0.05 @ 30	2.5
MU4891	MU4891	300	4.0	9.1	0.55	0.82	2.0	5.0	0.01 @ 30	4.0
MU4892	MU4891	300	4.0	9.1	0.51	0.69	2.0	2.0	0.01 @ 30	4.0
MU4893	MU4891	300	4.0	12	0.55	0.82	2.0	2.0	0.01 @ 30	4.0
MU4894	MU4891	300	4.0	12	0.74	0.86	2.0	1.0	0.01 @ 30	4.0



**HYPER-ABRUPT JUNCTION TUNING DIODES**  
**MICRO-I EPICAP DIODES**  
**MINI-L ABRUPT JUNCTION TUNING DIODES**  
**VOLTAGE-VARIABLE CAPACITANCE DIODES**

The following tables contain an alpha-numerical listing and short-form specifications for Motorola in-house non-registered hyper-abrupt junction tuning diodes, micro-I epicap diodes, mini-L abrupt junction tuning diodes and voltage-variable capacitance diodes.

**KEY**

Type	Ref.	CAPACITANCE				BV <sub>R</sub> Volts	Q @ f GHz	PD @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C Max C Min	Voltage Range				
				V <sub>1</sub> Volts	V <sub>2</sub> Volts			
Numerical Listing of Registered Type Numbers								
Reference device number Indicates specific Data Sheet on which device is characterized								
Nominal Capacitance usually C <sub>J</sub> (junction capacitance) With *, specified value is C <sub>r</sub> (total capacitance) C <sub>r</sub> = C <sub>J</sub> + C <sub>C</sub>								
Effective tuning Ratio (Capacitance at Voltage V <sub>1</sub> divided by capacitance at Voltage V <sub>2</sub> )								
Voltage range over which the tuning range is measured								
Reverse Breakdown Voltage								
Figure of Merit at this specified frequency								
Power Dissipation at 25°C								



## HYPER-ABRUPT JUNCTION TUNING DIODES

Type	Ref.	CAPACITANCE				BV <sub>R</sub>	Q @ f		P <sub>D</sub>	
		C <sub>J</sub> C <sub>T</sub> * pF	C(max) C(min)	Voltage Range			V <sub>1</sub> Volts	V <sub>2</sub> Volts	Volts	25°C Watts
BB105A	BB105A	2.8*	5.0	3.0	25	30	225	100M	0.4	
BB105B	BB105A	2.3*	6.0	3.0	25	30	225	100M	0.4	
BB105G	BB105A	2.8*	6.0	3.0	25	30	150	100M	0.4	
MV1401	MV1401	633*	14	1.0	10	12	200	0.013	0.4	
MV1403	MV1401		14	1.0	10	12	200	0.013	0.4	
MV1404	MV1401		14	1.0	10	12	200	0.013	0.4	
MV1405	MV1401		14	1.0	10	12	200	0.013	0.4	
MV3102	MV3102		25*				30	300	50M	0.4
MV3103	MV3102	26*				30	200	50M	0.4	
MV3140	MV3140	2.3*	4.5	3.0	25	30	150	0.1	0.4	
MV3141	MV3140	3.2*	4.0	3.0	25	30	150	0.1	0.4	
MV3142	MV3140	3.2*	3.5	3.0	25	30	50	0.1	0.4	

## MICRO-I EPICAP DIODES

Type	Ref.	CAPACITANCE				BV <sub>R</sub>  Volts	Q @ f		P <sub>D</sub> @ 25°C mW
		C <sub>J</sub> C <sub>T</sub> * pF	C(max) C(min)	Voltage Range					
				V <sub>1</sub> Volts	V <sub>2</sub> Volts				
MVI-2097	MVI-2907	1.2*				30	325	100	280
MVI-2098	MVI-2907	2.7*				30	325	100	280
MVI-2099	MVI-2907	4.0*				30	300	100	280
MVI-2100	MVI-2907	5.7*				30	300	100	280
MVI-2101	MVI-2907	7.5*				30	275	100	280
MVI-2102	MVI-2907	9.0*				30	275	100	280
MVI-2103	MVI-2907	11*				30	275	100	280
MVI-2104	MVI-2907	13.2*				30	275	100	280
MVI-2105	MVI-2907	16.5*				30	275	100	280
MVI-2106	MVI-2907	19.8*				30	250	100	280
MVI-2107	MVI-2907	24.2*				30	200	100	280
MVI-2108	MVI-2907	29.7*				30	200	100	280
MVI-2109	MVI-2907	36.3*				30	200	100	280



# MINI-L ABRUPT JUNCTION TUNING DIODES

Type	Ref.	C <sub>J</sub> C <sub>T</sub> * pF	BV <sub>R</sub>  Volts	Q	@ f GHz	P <sub>D</sub> @ 25°C Watts
MV3501	MV3501	7.5*	30	225	100M	0.4
MV3502	MV3501	9.0*	30	225	100M	0.4
MV3503	MV3501	11*	30	200	100M	0.4
MV3504	MV3501	13.2*	30	200	100M	0.4
MV3505	MV3501	16.5*	30	200	100M	0.4
MV3506	MV3501	19.8*	30	175	100M	0.4
MV3507	MV3501	24.2*	30	175	100M	0.4



## POWER VARACTOR MULTIPLIERS

This table contains an alpha-numerical listing and short-form specifications for Motorola in-house non-registered power varactor multipliers.

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### KEY

Type	Ref.	$C_J$ $C_T^*$ pF	BVR Volts	$Q @ f$ GHz	$P_D$ @ 25°C Watts
Numerical Listing of Registered Type Numbers					
Reference device number Indicates specific Data Sheet on which device is characterized					
Nominal Capacitance usually $C_J$ (junction capacitance) With *, specified value is $C_T$ (total capacitance) $C_T = C_J + C_C$					
Reverse Breakdown Voltage					
Figure of Merit at this specified frequency					
Power Dissipation at 25°C					



## POWER VARACTOR MULTIPLIERS

TYPE	REF.	$C_J$ $C_T^*$ pF	$BV_R$ Volts	$Q$ @ $f$		$P_D$ @ 25°C Watts
					GHz	
MV1804	1N4387	35	150	150	0.05	20
MV1805C	MV805C	30*	80			18
MV1806	1N4388	20*	100	200	0.05	10
MV1806C	1N5149	11.5*	80	800	0.05	10
MV1807C	1N5149	11.5*	80	800	0.05	14
MV1809C	MV1809C	14.4*	75			9.0
MV1809C1	MV1809C	13.2*	75			14
MV1810A	1N5154	2.1*	35	1700	0.05	3.5
MV1810B	1N5155	2.1*	35	1700	0.05	3.5
MV1812A	1N5156	1.0*	20	3600	0.05	3.25
MV1812B	1N5157	0.6*	20	3600	0.05	3.25
MV1816A	MV1816B	3.7*	75			7.5
MV1816A1	MV1816B	3.4*	75			11.5
MV1816B	MV1816B	3.6*	75			7.5
MV1816B1	MV1816B	3.3*	75			11.5
MV1817A	MV1817B	1.3*	35			5.0
MV1817A1	MV1817B	1.2*	35			7.0
MV1817B	MV1817B	1.2*	35			5.0
MV1817B1	MV1817B	1.1*	35			7.0



# VOLTAGE-VARIABLE CAPACITANCE DIODES

## INDEX AND SHORT-FORM SPECIFICATIONS

The following table provides a numerical index and short-form specifications for Voltage-Variable Capacitance Diodes with EIA-registered type numbers.

### KEY

TYPE	REF.	CAPACITANCE					BV <sub>R</sub>	Q @ f	P <sub>D</sub> @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C Tol %	C (max) C (min)	Voltage Range				
					V <sub>1</sub> Volts	V <sub>2</sub> Volts	Volts		
Numerical Listing of Registered Type Numbers									
Reference device number indicates specific Data Sheet on which device is characterized									
Nominal Capacitance usually C <sub>J</sub> (junction capacitance) With *, specified value is C <sub>T</sub> (total capacitance) C <sub>T</sub> = C <sub>J</sub> + C <sub>c</sub>									
Tolerance of capacitance listed in preceding column									
Effective tuning Ratio (Capacitance at Voltage V <sub>1</sub> divided by capacitance at Voltage V <sub>2</sub> )									
Voltage range over which the tuning range is measured									
Reverse Breakdown Voltage									
Figure of Merit at this specified frequency									
Power Dissipation at 25°C									



# VOLTAGE-VARIABLE CAPACITANCE DIODES

Type	Ref.	CAPACITANCE				BV <sub>R</sub> Volts	Q	@ f MHz* GHz	P <sub>D</sub> @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C(max) C(min)	Voltage Range					
				V <sub>1</sub> Volts	V <sub>2</sub> Volts				
MV104	MV104	42*				32	100	100M	
MV109	MV109	32*				30	280	50M	400mW
MV830	MV830	16.5*	2.0	4.0	25	30	30	0.05	0.4
MV831	MV830	19.8*	2.0	4.0	25	30	25	0.05	0.4
MV832	MV830	24.2*	2.1	4.0	25	30	25	0.05	0.4
MV833	MV830	29.7*	2.1	4.0	25	30	25	0.05	0.4
MV834	MV830	36.3*	2.12	4.0	25	30	20	0.05	0.4
MV835	MV830	42.9*	2.12	4.0	25	30	20	0.05	0.4
MV836	MV830	51.7*	2.15	4.0	25	30	15	0.05	0.4
MV837	MV830	61.6*	2.15	4.0	25	30	15	0.05	0.4
MV838	MV830	74.8*	2.18	4.0	25	30	15	0.05	0.4
MV839	MV830	90.2*	2.18	4.0	25	30	10	0.05	0.4
MV840	MV830	110*	2.18	4.0	25	30	10	0.05	0.4
MV1620	MV1620	7.5*	3.2	2.0	20	20	300	0.05	2.0
MV1622	MV1620	9.0*	3.2	2.0	20	20	300	0.05	2.0
MV1624	MV1620	11*	3.2	2.0	20	20	300	0.05	2.0
MV1626	MV1620	13.2*	3.2	2.0	20	20	300	0.05	2.0
MV1628	MV1620	16.5*	3.2	2.0	20	20	250	0.05	2.0
MV1630	MV1620	19.8*	3.2	2.0	20	20	250	0.05	2.0
MV1632	MV1620	22.0*	3.2	2.0	20	20	250	0.05	2.0
MV1634	MV1620	24.2*	3.2	2.0	20	20	250	0.05	2.0
MV1636	MV1620	29.7*	3.2	2.0	20	20	200	0.05	2.0
MV1638	MV1620	36.3*	3.2	2.0	20	20	200	0.05	2.0
MV1640	MV1620	42.9*	3.2	2.0	20	20	200	0.05	2.0
MV1642	MV1620	51.7*	3.2	2.0	20	20	200	0.05	2.0
MV1644	MV1620	61.6*	3.2	2.0	20	20	150	0.05	2.0
MV1646	MV1620	74.8*	3.2	2.0	20	20	150	0.05	2.0
MV1648	MV1620	90.2*	3.2	2.0	20	20	150	0.05	2.0
MV1650	MV1620	110*	3.2	2.0	20	20	150	0.05	2.0
MV1652	MV1652	135*	2.6	2.0	20	20	350	0.02	0.4
MV1654	MV1652	165*	2.6	2.0	20	20	250	0.02	0.4
MV1656	MV1652	198*	2.6	2.0	20	20	200	0.02	0.4
MV1658	MV1652	220*	2.6	2.0	20	20	200	0.02	0.4
MV1660	MV1652	242*	2.6	2.0	20	20	150	0.02	0.4
MV1662	MV1652	275*	2.3	2.0	15	15	150	0.02	0.4
MV1664	MV1652	300*	2.3	2.0	15	15	100	0.02	0.4
MV1666	MV1652	363*	2.3	2.0	15	15	100	0.02	0.4
MV1858D	MV1858D	1.3*	2.7	4.0	60	60	350	100*	5.0
MV1860D	MV1858D	2.64*	3.1	4.0	60	60	350	100*	5.0
MV1862D	MV1858D	3.63*	3.3	4.0	60	60	300	100*	5.0
MV1863D	MV1858D	5.17*	3.3	4.0	60	60	300	100*	5.0
MV1864D	MV1858D	7.5*	3.4	4.0	60	60	300	100*	5.0
MV1865D	MV1858D	9.02*	3.4	4.0	60	60	300	100*	5.0
MV1866	MV1866	11*		4.0	60	60	700	50M	2.0
MV1866D	MV1858D	11*	3.5	4.0	60	60	250	100*	5.0
MV1868	MV1866	13.2*		4.0	60	60	700	50M	2.0
MV1868D	MV1858D	13.2*	3.5	4.0	60	60	200	100*	5.0
MV1870	MV1866	16.5*		4.0	60	60	700	50M	2.0
MV1870D	MV1858D	16.5*	3.5	4.0	60	60	200	100*	5.0
MV1871	MV1866	19.8*		4.0	60	60	700	50M	2.0
MV1872	MV1866	25.2*		4.0	60	60	700	50M	2.0



## VOLTAGE-VARIABLE CAPACITANCE DIODES

Type	Ref.	CAPACITANCE				BV <sub>R</sub>  Volts	Ω @ f		P <sub>D</sub> @ 25°C Watts
		C <sub>J</sub> C <sub>T</sub> * pF	C (Max) C (Min)	Voltage Range					
				V <sub>1</sub> Volts	V <sub>2</sub> Volts			GHz	
MV1874	MV1866	29.7*		4.0	60	60	700	50M	2.0
MV1876	MV1866	36.3*		4.0	60	60	700	50M	2.0
MV1877	MV1866	42.9*		4.0	60	60	700	50M	2.0
MV1878	MV1866	51.7		4.0	60	60	700	50M	2.0
MV2101	MV2101	7.5*	3.2	2.0	30	30	450	0.05	0.28
MV2102	MV2101	9.0*	3.2	2.0	30	30	450	0.05	0.28
MV2103	MV2101	11*	3.2	2.0	30	30	400	0.05	0.28
MV2104	MV2101	13.2*	3.2	2.0	30	30	400	0.05	0.28
MV2105	MV2101	16.5*	3.2	2.0	30	30	400	0.05	0.28
MV2106	MV2101	19.8*	3.2	2.0	30	30	350	0.05	0.28
MV2107	MV2101	24.2*	3.2	2.0	30	30	350	0.05	0.28
MV2108	MV2101	29.7*	3.2	2.0	30	30	300	0.05	0.28
MV2109	MV2101	36.3*	3.2	2.0	30	30	200	0.05	0.28
MV2110	MV2101	42.9*	3.2	2.0	30	30	150	0.05	0.28
MV2111	MV2101	51.7*	3.2	2.0	30	30	150	0.05	0.28
MV2112	MV2101	61.6*	3.3	2.0	30	30	150	0.05	0.28
MV2113	MV2101	74.8*	3.3	2.0	30	30	150	0.05	0.28
MV2114	MV2101	90.2*	3.3	2.0	30	30	100	0.05	0.28
MV2115	MV2101	110*	3.3	2.0	30	30	100	0.05	0.28
MV2201	MV2201	8.0*	2.3	1.0	10	25	300	0.05	0.28
MV2203	MV2201	11.5*	2.4	1.0	10	25	200	0.05	0.28
MV2205	MV2201	17*	2.5	1.0	10	25	200	0.05	0.28
MV2209	MV2201	37*	2.5	1.0	10	25	150	0.05	0.28
MV2301	MV2301	135*	2.3	2.0	20	20	250	0.02	0.5
MV2302	MV2301	165*	2.3	2.0	20	20	250	0.02	0.5
MV2303	MV2301	198*	2.3	2.0	20	20	200	0.02	0.5
MV2304	MV2301	220*	2.3	2.0	20	20	200	0.02	0.5
MV2305	MV2301	242*	2.3	2.0	20	20	150	0.02	0.5
MV2306	MV2301	275*	2.3	2.0	20	20	150	0.02	0.5
MV2307	MV2301	300*	2.3	2.0	20	20	100	0.02	0.5
MV2308	MV2301	363*	2.3	2.0	20	20	100	0.02	0.5







# DEVICES FOR MILITARY APPLICATIONS

## 1N. . . Device Numbers

ASSEMBLIES  
CURRENT REGULATORS  
DIODES  
    Reference  
    Signal  
    Zener  
RECTIFIERS

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## 2N. . . Device Numbers

THYRISTORS  
TRANSISTORS  
    Amplifier  
    Chopper  
    FETs  
    Multiple Device  
    Power  
    Switching and Unijunction

Page 4-4

## Integrated Circuits

MTTL  
McMOS  
Linear  
Memories

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# DEVICES FOR MILITARY APPLICATIONS



SILICON ZENER  
DIODES ±5% SERIES

MIL-S-19500/127

1N746A JAN,JTX,JTXV. . thru . . . . .  
1N759A JAN,JTX,JTXV. . . . .

MIL-S-19500/117

1N962B JAN,JTX,JTXV. . thru . . . . .  
1N992B JAN,JTX,JTXV. . . . .

\*MIL-S-19500/114

1N2804B & RB JAN,JTX . . thru . . . . .  
1N2808B & RB JAN,JTX . . . . .  
1N2811B JAN,JTX . . . . .  
1N2813B JAN,JTX . . . . .  
1N2814B JAN,JTX . . . . .  
1N2816B JAN,JTX . . . . .  
1N2818B JAN,JTX . . thru . . . . .  
1N2820B JAN,JTX. . . . .  
1N2822B JAN,JTX . . thru . . . . .  
1N2827B JAN,JTX . . . . .  
1N2831B JAN,JTX . . thru . . . . .  
1N2838B JAN,JTX. . . . .  
1N2840B JAN,JTX . . thru . . . . .  
1N2846B JAN,JTX. . . . .

\*MIL-S-19500/124

1N2970B JAN,JTX . . thru . . . . .  
1N2977B JAN,JTX. . . . .  
1N2979B JAN,JTX . . . . .  
1N2980B JAN,JTX . . . . .  
1N2982B JAN,JTX . . . . .  
1N2984B JAN,JTX . . thru . . . . .  
1N2986B JAN,JTX. . . . .  
1N2988B JAN,JTX . . thru . . . . .  
1N2993B JAN,JTX. . . . .  
1N2995B JAN,JTX . . . . .  
1N2997B JAN,JTX . . . . .  
1N2999B JAN,JTX . . thru . . . . .  
1N3005B JAN,JTX. . . . .  
1N3007B JAN,JTX . . thru . . . . .  
1N3009B JAN,JTX. . . . .  
1N3011B JAN,JTX . . . . .  
1N3012B JAN,JTX . . . . .  
1N3014B JAN,JTX . . . . .  
1N3015B JAN,JTX . . . . .

MIL-S-19500/115

1N3016B JAN,JTX,JTXV. . thru . . . . .  
1N3051B JAN,JTX,JTXV. . . . .

\*MIL-S-19500/358

1N3305B JAN,JTX . . thru . . . . .  
1N3312B JAN,JTX. . . . .  
1N3314B JAN,JTX . . . . .  
1N3315B JAN,JTX . . . . .  
1N3317B JAN,JTX . . . . .  
1N3319B JAN,JTX . . thru . . . . .  
1N3321B JAN,JTX. . . . .  
1N3323B JAN,JTX . . thru . . . . .  
1N3328B JAN,JTX. . . . .  
1N3330B JAN,JTX . . . . .  
1N3332B JAN,JTX . . . . .  
1N334B JAN,JTX . . thru . . . . .  
1N3340B JAN,JTX. . . . .  
1N3342B JAN,JTX . . thru . . . . .  
1N3344B JAN,JTX. . . . .  
1N3346B JAN,JTX . . . . .  
1N3347B JAN,JTX . . . . .  
1N3349B JAN,JTX . . . . .  
1N3350B JAN,JTX . . . . .

MIL-S-19500/115

1N3821A JAN,JTX,JTXV. . thru . . . . .  
1N3828A JAN,JTX,JTXV. . . . .

DEVICES FOR MILITARY  
APPLICATIONS

The following tables list devices that  
comply with military specifications.

1N. . . Device Numbers

ASSEMBLIES  
CURRENT REGULATORS  
DIODES  
Reference  
Signal  
Zener  
RECTIFIERS

SILICON ZENER  
DIODES ±5% SERIES (Cont.)

\*\*MIL-S-19500/272

1N3993A JAN,JTX . . thru . . . . .  
1N4000A JAN,JTX. . . . .

MIL-S-19500/435

1N4099 JAN,JTX,JTXV. . thru . . . . .  
1N4135 JAN,JTX,JTXV. . . . .

MIL-S-19500/127

1N4370A JAN,JTX,JTXV. . thru . . . . .  
1N4372A JAN,JTX,JTXV. . . . .

\*MIL-S-19500/358

1N4549B JAN,JTX . . thru . . . . .  
1N4554B JAN,JTX. . . . .

MIL-S-19500/435

1N4614 JAN,JTX,JTXV. . thru . . . . .  
1N4627 JAN,JTX,JTXV. . . . .

\*Reverse Polarities (Suffix RB) are available.  
\*\*Reverse Polarities (Suffix RA) are available.

TC REFERENCE  
DIODES

MIL-S-19500

1N429 JAN . . . . . /299  
1N821 JAN,JTX,JTXV . . . . . /159  
1N823 JAN,JTX,JTXV . . . . . /159  
1N825 JAN,JTX,JTXV . . . . . /159  
1N827 JAN,JTX,JTXV . . . . . /159  
1N829 JAN,JTX,JTXV . . . . . /159  
1N935B JAN,JTX,JTXV . . . . . /156  
1N937B JAN,JTX,JTXV . . . . . /156  
1N938B JAN,JTX,JTXV . . . . . /156  
1N939B JAN,JTX,JTXV . . . . . /156  
1N914B JAN,JTX . . . . . /157  
1N943B JAN,JTX . . . . . /157  
1N944B JAN,JTX . . . . . /157  
1N945B JAN,JTX . . . . . /157  
1N3154 JAN,JTX . . . . . /158  
1N3155 JAN,JTX . . . . . /158  
1N3156 JAN,JTX . . . . . /158  
1N3157 JAN,JTX . . . . . /158



# DIODE ASSEMBLIES

## MIL-S-19500

1N1530A JAN	...../320
1N1742A JAN	...../298

# CURRENT REGULATORS

## MIL-S-19500/463

1N5285 JAN,JTX,JTXV .. thru .....	
1N5314 JAN,JTX,JTXV .....	

# RECTIFIERS

## MIL-S-19500

1N3890 JAN,JTX	...../304
1N3891 JAN,JTX	...../304
1N3892 JAN,JTX	...../304

The following tables list devices that comply with military specifications.

## 2N ... Device Numbers

TRANSISTORS – Amplifier, Chopper,  
Multiple Device, Power, Switching and Unijunction  
THYRISTORS

# SWITCHING AND HIGH FREQUENCY TRANSISTORS

## MIL-S-19500

2N393 JAN	...../77	2N2219A JAN,JTX,JTXV ..	/251	2N3486A JAN,JTX	...../392
2N499 JAN	...../72	2N2221 JAN,JTX,JTXV ..	/255	2N3498 JAN,JTX,JTXV ..	/366
2N499A JAN	...../72	2N2221A JAN,JTX,JTXV ..	/255	2N3499 JAN,JTX,JTXV ..	/366
2N501A JAN	...../62	2N2222 JAN,JTX,JTXV ..	/255	2N3500 JAN,JTX,JTXV ..	/366
2N502A JAN	...../112	2N2222A JAN,JTX,JTXV ..	/255	2N3501 JAN,JTX,JTXV ..	/366
2N502B JAN	...../112	2N2369A JAN,JTX,JTXV ..	/317	2N3506 JAN,JTX,JTXV ..	/349
2N559 JAN,JTX	...../152	2N2481 JAN,JTX	...../268	2N3507 JAN,JTX,JTXV ..	/349
2N703 JAN	...../153	2N2857 JAN,JTX,JTXV ..	/343	2N3634 JAN,JTX,JTXV ..	/357
2N705 JAN	...../86	2N2904 JAN,JTX,JTXV ..	/290	2N3635 JAN,JTX,JTXV ..	/357
2N706 JAN	...../120	2N2904A JAN,JTX,JTXV ..	/290	2N3636 JAN,JTX,JTXV ..	/357
2N708 JAN,JTX	...../312	2N2905 JAN,JTX,JTXV ..	/290	2N3637 JAN,JTX,JTXV ..	/357
2N718A JAN,JTX,JTXV ..	/181	2N2905A JAN,JTX,JTXV ..	/290	2N3743 JAN,JTX,JTXV ..	/397
2N869A JAN,JTX	...../283	2N2906 JAN,JTX,JTXV ..	/291	2N3763 JAN,JTX	...../396
2N914 JAN,JTX	...../373	2N2906A JAN,JTX,JTXV ..	/291	2N3765 JAN,JTX	...../396
2N916 JAN	...../271	2N2907 JAN,JTX,JTXV ..	/291	2N3959 JAN,JTX	...../399
2N929 JAN,JTX	...../253	2N2907A JAN,JTX,JTXV ..	/291	2N3960 JAN,JTX	...../399
2N930 JAN,JTX	...../253	2N3013 JAN,JTX	...../287	2N4405 JAN,JTX	...../448
2N962 JAN	...../258	2N3250A JAN,JTX,JTXV ..	/323	2N4449 JAN,JTX,JTXV ..	/317
2N964 JAN	...../258	2N3251A JAN,JTX,JTXV ..	/323	2N4453 JAN,JTX	...../283B
2N1131 JAN	...../177	2N3253 JAN	...../347	2N4930 JAN,JTX,JTXV ..	/397
2N1132 JAN	...../177	2N3444 JAN	...../347	2N4931 JAN,JTX,JTXV ..	/397
2N1613 JAN,JTX	...../181	2N3449 JAN	...../338	2N4957 JAN,JTX	...../426
2N2218 JAN,JTX,JTXV ..	/251	2N3467 JAN,JTX,JTXV ..	/348	2N5581 JAN,JTX	...../423
2N2218A JAN,JTX,JTXV ..	/251	2N3468 JAN,JTX,JTXV ..	/348	2N5582 JAN,JTX	...../423
2N2219 JAN,JTX,JTXV ..	/251	2N3485A JAN,JTX	...../392		



POWER TRANSISTORS

MIL-S-19500			
2N174A JAN	...../13	2N1555A JAN	...../331
2N297A JAN	...../36	2N1556A JAN	...../331
2N665 JAN	...../58	2N1557A JAN	...../330
2N1011 JAN	...../67	2N1558A JAN	...../330
2N1046 JAN	...../88	2N1559A JAN	...../330
2N1120 JAN	...../68	2N1560A JAN	...../330
2N1165 JAN	...../178	2N1651 JAN	...../219
2N1358 JAN	...../122	2N1652 JAN	...../219
2N1412 JAN	...../76	2N1653 JAN	...../219
2N1412A JAN	...../76	2N2079A JAN	...../340
2N1549A JAN	...../332	2N2528 JAN	...../309
2N1550A JAN	...../332	2N2834 JAN	...../310
2N1551A JAN	...../332	2N3055 JAN,JTX	...../407
2N1552A JAN	...../332	2N3715 JAN,JTX	...../408
2N1553A JAN	...../331	2N3716 JAN,JTX	...../408
2N1554A JAN	...../331	2N3739 JAN,JTX	...../402
		2N3740 JAN,JTX	...../441
		2N3741 JAN,JTX	...../441
		2N3791 JAN,JTX	...../379
		2N3792 JAN,JTX	...../379
		2N3867 JAN,JTX,JTXV	...../350
		2N3868 JAN,JTX,JTXV	...../350
		2N3902 JAN,JTX	...../371A
		2N4399 JAN,JTX	...../433
		2N5156 JAN	...../416
		2N5302 JAN,JTX	...../456
		2N5303 JAN,JTX	...../456
		2N5685 JAN,JTX	...../464
		2N5686 JAN,JTX	...../464
		2N5745 JAN,JTX	...../433

SILICON CONTROLLED RECTIFIERS

MIL-S-19500	
2N4199 JAN	...../372
2N4200 JAN	...../372
2N4201 JAN	...../372
2N4202 JAN	...../372
2N4203 JAN	...../372
2N4204 JAN	...../372

RF POWER TRANSISTORS

MIL-S-19500	
2N700A JAN	...../123
2N918 JAN,JTX,JTXV	...../301
2N1142 JAN	...../87
2N1195 JAN	...../71
2N2273 JAN	...../244
2N2708 JAN	...../302
2N3127 JAN	...../346
2N3375 JAN,JTX,JTXV	...../341
2N3553 JAN,JTX,JTXV	...../341
2N3866 JAN,JTX	...../398
2N3866A JAN,JTX	...../398

FIELD-EFFECT TRANSISTORS

MIL-S-19500	
2N3330 JAN,JTX	...../378
2N3821 JAN,JTX,JTXV	...../375
2N3822 JAN,JTX,JTXV	...../375
2N3823 JAN,JTX,JTXV	...../375
2N4092 JAN,JTX	...../431
2N4093 JAN,JTX	...../431

MULTIPLE DEVICES

MIL-S-19500	
2N2060 JAN,JTX,JTXV	...../270
2N2639 JAN,JTX	...../316
2N2642 JAN,JTX	...../316
2N2919 JAN,JTX,JTXV	...../355
2N2920 JAN,JTX,JTXV	...../355
2N3810 JAN,JTX	...../336
2N3811 JAN,JTX	...../336
2N3838 JAN,JTX	...../421
2N4854 JAN,JTX	...../421

MILLIWATT TRANSISTORS

MIL-S-19500	
2N331 JAN	...../4
2N398A JAN	...../174
2N404 JAN	...../20
2N404A JAN	...../20
2N461 JAN	...../45
2N464 JAN	...../49
2N465 JAN	...../49
2N466 JAN	...../51
2N467 JAN	...../49
2N526 JAN	...../60
2N650A JAN	...../175
2N651A JAN	...../175
2N652A JAN	...../175
2N1008B JAN	...../196

UNIJUNCTION

MIL-S-19500	
2N4948 JAN,JTX	...../388
2N4949 JAN,JTX	...../388
2N5431 JAN,JTX	...../425



INTEGRATED CIRCUITS

A typical military part number consists of the JAN prefix, the general specification number, the detail specification number, and a coded part number.

PART NUMBER DESCRIPTION

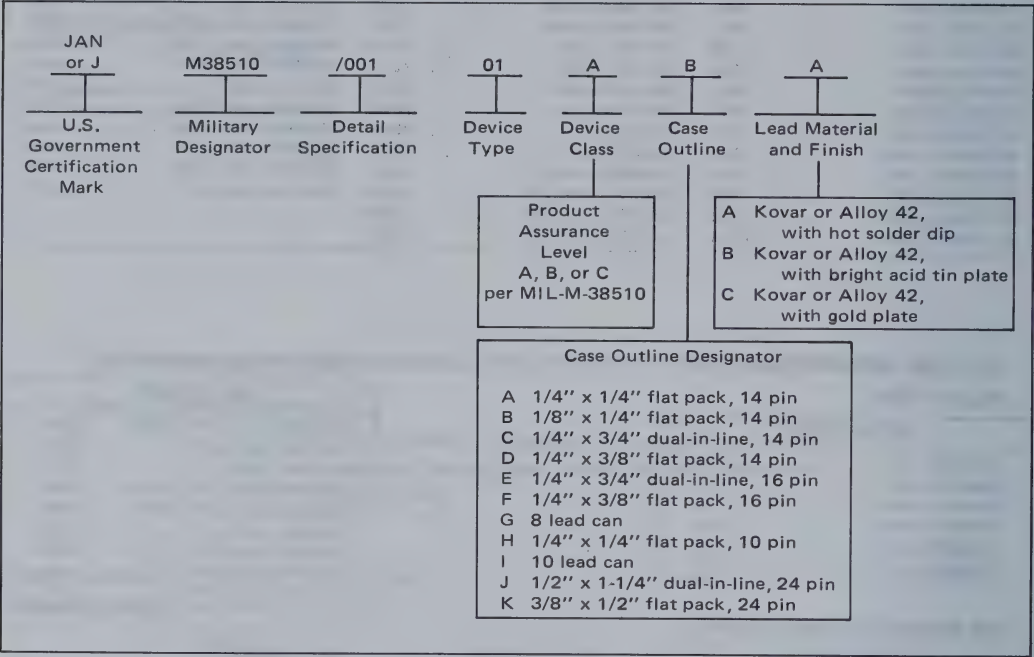


TABLE I – JAN PART NUMBER TO MOTOROLA PART NUMBER CROSS REFERENCE

MTTL INTEGRATED CIRCUITS							
JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.
MIL-M-38510/001 NAND Gates		MIL-M-38510/003 NAND Buffers		MIL-M-38510/006 Binary Full Adders		MIL-M-38510/009 Shift Registers	
01	MC5430	01	MC5440	01	MC15482	01	MC5495
02	MC5420	02	MC5437	02	MC5483	02	MC5496
03	MC5410	03	MC5438	MIL-M-38510/007 Exclusive OR Gate		03	MC54164 A
04	MC5400	MIL-M-38510/004 NOR Gates				04	MC54165
05	MC5404			05	MC54194		
06	MC5412 *	01	MC5402	01	MC3121	06	MC54195
07	MC5401	02	MC5423	MIL-M-38510/008 Hex Buffers/Drivers		MIL-M-38510/010 Decoders	
08	MC5405	03	MC5425				
09	MC5403	04	MC5427	01	MC5406	01	MC5442
MIL-M-38510/002 Flip-Flops		MIL-M-38510/005 AND-OR-INVERT Gates		02	MC5416	02	MC5443
				03	MC5407	03	MC5444
01	MC5472	01	MC5450	04	MC5417	04	MC5445
02	MC5473	02	MC5451				
03	MC54107	03	MC5453				
04	MC5476	04	MC5454				
05	MC5474 *						
06	MC5470						
07	MC5479						

\* Not presently being manufactured or planned for immediate introduction.  
\*\* JAN type number must be completed as shown in the Part Number Description.



# DEVICES FOR MILITARY APPLICATIONS (Continued)

**TABLE I — JAN PART NUMBER TO MOTOROLA PART NUMBER  
CROSS REFERENCE (Continued)**

MTTL INTEGRATED CIRCUITS (Continued)							
JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.
MIL-M-38510/011 Arithmetic Logic Unit		MIL-M-38510/014 Data Selectors/ Multiplexers		MIL-M-38510/021 Low-Power Flip-Flops		MIL-M-38510/024 High-Speed NAND Buffer	
01	MC54181	01	MC54150	01	MC54L71 *	01	MC54H40
MIL-M-38510/012 Monostable Multivibrators		02	MC9312	02	MC54L72 *	MIL-M-38510/026 Low-Power Exclusive OR Gate	
01	MC54121	03	MC54153	03	MC54L73 *	MIL-M-38510/027 Low-Power NOR Gate	
02	MC54122	04	MC9309	04	MC54L78 *	01	MC54L02 *
03	MC54123	05	MC9322	05	MC54L74 *	MIL-M-38510/028 Low-Power Shift Registers	
MIL-M-38510/013 Counters		06	MC54151	MIL-M-38510/022 High-Speed Flip-Flops		01	MC54L86 *
01	MC5492	MIL-M-38510/015 Bistable Latches		01	MC54H72	MIL-M-38510/029 Low-Power Decoders	
02	MC5493	01	MC5475	02	MC54H73	01	MC54L95 *
03	MC54160	02	MC5477	03	MC54H74A	02	MC54L164 *
04	MC54163	MIL-M-38510/016 AND Gates		04	MC54H76 *	MIL-M-38510/020 Low-Power NAND Gates	
05	MC54162	01	MC5408	05	MC54H101	01	MC54L42 *
06	MC54161	02	MC5409	06	MC54H103	02	MC54L43 *
07	MC5490	MIL-M-38510/020 Low-Power NAND Gates		MIL-M-38510/023 High-Speed NAND Gates		03	MC54L44 *
08	MC54192	01	MC54L30 *	01	MC54H30	04	MC54L46 *
09	MC54193	02	MC54L20 *	02	MC54H20	05	MC54L47 *
		03	MC54L10 *	03	MC54H10		
		04	MC54L00 *	04	MC54H00		
		05	MC54L04 *	05	MC54H04		
		06	MC54L03 *	06	MC54H01		
				07	MC54H22		
McMOS INTEGRATED CIRCUITS							
JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.
MIL-M-38510/050 NAND Gates		MIL-M-38510/052 NOR Gates		MIL-M-38510/055 Buffers/Converters		MIL-M-38510/057 Static Shift Registers	
01	MC14011A	01	MC14000A	01	MC14009A	01	MC14006A
02	MC14012A	02	MC14001A	02	MC14010A	02	MC14014A *
03	MC14023A	03	MC14002A	03	MC14049A	03	MC14015A
MIL-M-38510/051 Flip-Flops		04	MC14025A	04	MC14050A	04	MC14021A
01	MC14013A	MIL-M-38510/053 AND-OR-INVERT Gates		MIL-M-38510/056 Counters/Dividers		05	MC14031A
02	MC14027A	01	MC14007A	01	MC14017A	MIL-M-38510/058 Quad Analog Switch	
		02	MC14019A *	02	MC14018A *	01	MC14016A
				03	MC14020A		
				04	MC14022A		
				05	MC14024A		

\* Not presently being manufactured or planned for immediate introduction.

\*\* JAN type number must be completed as shown in the Part Number Description.



# DEVICES FOR MILITARY APPLICATIONS (Continued)

**TABLE I – JAN PART NUMBER TO MOTOROLA PART NUMBER  
CROSS REFERENCE (Continued)**

LINEAR INTEGRATED CIRCUITS							
JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.	JAN Part No.**	Motorola Standard Part No.
MIL-M-38510/101 Operational Amplifiers		MIL-M-38510/102 Voltage Regulator		MIL-M-38510/104 Line Drivers and Receivers		MIL-M-38510/106 Voltage Follower Operational Amplifiers	
01	MC1741	01	MC1723	01	MC55107	01	MLM102 *
02	MC1747	MIL-M-38510/103 Voltage Comparators		02	MC55108	02	MLM110
03	MLM101A	01	MC1710	MIL-M-38510/105 Video Amplifier			
04	MLM108A	02	MC1711				
		03	MLM106 *	01	MC1733		
MEMORIES							
JAN Part No.**	Motorola Standard Part No.						
MIL-M-38510/201 Programmable Read Only Memories							
01	MCM5303						
02	MCM5304						

\* Not presently being manufactured or planned for immediate introduction.

\*\* JAN type number must be completed as shown in the Part Number Description.



# DEVICES FOR MILITARY APPLICATIONS (Continued)

## TABLE II — MOTOROLA PART NUMBER TO JAN PART NUMBER CROSS REFERENCE

MTTL INTEGRATED CIRCUITS		
Motorola Standard Part No.	Description	JAN Part No.**
MC15482	2-Bit Full Adder	/006 01
MC3121	Quad 2-Input Exclusive OR Gate	/007 01
MC5400	Quad 2-Input Positive NAND Gate	/001 04
MC5401	Quad 2-Input Positive NAND Gate (Open Collector Output)	/001 07
MC5402	Quad 2-Input Positive NOR Gate	/004 01
MC5403	Quad 2-Input Positive NAND Gate (Open Collector Output) (Pin connections different from MC5401)	/001 09
MC5404	Hex 1-Input Inverter Gate	/001 05
MC5405	Hex 1-Input Inverter Gate (Open Collector Output)	/001 08
MC5406	Hex Inverter Buffer/Driver (30-Volt Output)	/008 01
MC5407	Hex Buffer/Driver (30-Volt Output)	/008 03
MC5408	Quad 2-Input Positive AND Gate	/016 01
MC5409	Quad 2-Input Positive AND Gate (Open Collector Output)	/016 02
MC5410	Triple 3-Input Positive NAND Gate	/001 03
MC5412 *	Triple 3-Input Positive NAND Gate (Open Collector Output)	/001 06
MC5416	Hex Inverter Buffer/Driver (15-Volt Output)	/008 02
MC5417	Hex Buffer/Driver (15-Volt Output)	/008 04
MC5420	Dual 4-Input Positive NAND Gate	/001 02
MC5423	Dual 4-Input Positive NOR Gate with Strobe and Expandable Input	/004 02
MC5425	Dual 4-Input Positive NOR Gate with Strobe	/004 03
MC5427	Triple 3-Input Positive NOR Gate	/004 04
MC5430	Single 8-Input Positive NAND Gate	/001 01
MC5437	Quad 2-Input Positive NAND Buffer	/003 02
MC5438	Quad 2-Input Positive NAND Buffer (Open Collector Output)	/003 03
MC5440	Dual 4-Input Positive NAND Buffer	/003 01
MC5442	BCD-to-Decimal Decoder	/010 01
MC5443	Excess-3-to-Decimal Decoder	/010 02
MC5444	Excess-3-Gray-to-Decimal Decoder	/010 03
MC5445	BCD-to-Decimal Decoder/Driver (30-Volt, Open Collector Output)	/010 04
MC5446 *	BCD-to-Seven-Segment Decoder/Driver (30-Volt, Open Collector Output)	/010 06
MC5447 *	BCD-to-Seven-Segment Decoder/Driver (15-Volt, Open Collector Output)	/010 07
MC5448	BCD-to-Seven-Segment Decoder/Driver	/010 08
MC5449	BCD-to-Seven-Segment Decoder/Driver (5.5-Volt, Open Collector Output)	/010 09
MC5450	Expandable Dual 2-Wide, 2-Input AND-OR-INVERT Gate	/005 01
MC5451	Dual 2-Wide, 2-Input AND-OR-INVERT Gate	/005 02
MC5453	Expandable 4-Wide, 2-Input AND-OR-INVERT Gate	/005 03
MC5454	4-Wide, 2-Input AND-OR-INVERT Gate	/005 04
MC5470	Single Edge-Triggered J-K Flip-Flop	/002 06
MC5472	Single J-K Master-Slave Flip-Flop	/002 01
MC5473	Dual J-K Master-Slave Flip-Flop (No Preset)	/002 02
MC5474 *	Dual D-Type Edge-Triggered Flip-Flop	/002 05
MC5475	4-Bit Latch (Complementary Outputs)	/015 01
MC5476	Dual J-K Master-Slave Flip-Flop	/002 04
MC5477	4-Bit Latch	/015 02
MC5479	Dual D-Type Edge-Triggered Flip-Flop (Buffered Output)	/002 07
MC5483	4-Bit Full Adder	/006 02
MC5490	Decade Counter	/013 07
MC5492	Divide-by-12 Counter	/013 01
MC5493	4-Bit Binary Counter	/013 02
MC5495	4-Bit Right-Shift, Left-Shift Register	/009 01
MC5496	5-Bit Shift Register	/009 02
MC54107	Dual J-K Master-Slave Flip-Flop (No Preset)	/002 03
MC54121	Single Monostable Multivibrator	/012 01
MC54122	Single Retriggerable Monostable Multivibrator with Clear	/012 02
MC54123	Dual Retriggerable Monostable Multivibrator with Clear	/012 03
MC54145	BCD-to-Decimal Decoder/Driver (15-Volt, Open Collector Output)	/010 05
MC54150	16-Input Data Selector/Multiplexer, with Enable	/014 01
MC54151	8-Input Data Selector/Multiplexer, with Enable	/014 06
MC54153	Dual 4-Input Data Selector/Multiplexer, with Enable	/014 03
MC54160	Synchronous 4-Bit Decade Counter (Asynchronous Clear)	/013 03
MC54161	Synchronous 4-Bit Binary Counter (Asynchronous Clear)	/013 06

\* Not presently being manufactured or planned for immediate introduction.

\*\* JAN type number must be completed as shown in the Part Number Description.



TABLE II — MOTOROLA PART NUMBER TO JAN PART NUMBER  
CROSS REFERENCE (Continued)

MTTL INTEGRATED CIRCUITS (Continued)		
Motorola Standard Part No.	Description	JAN Part No.**
MC54162	Synchronous 4-Bit Decade Counter (Synchronous Clear)	/013 05
MC54163	Synchronous 4-Bit Binary Counter (Synchronous Clear)	/013 04
MC54164A	8-Bit Parallel-Out Serial Shift Register	/009 03
MC54165	8-Bit Parallel-Load Shift Register	/009 04
MC54181	Arithmetic Logic Unit/Function Generator	/011 01
MC54192	Presettable Decade Up/Down Counter	/013 08
MC54193	Presettable 4-Bit Binary Up/Down Counter	/013 09
MC54194	4-Bit Bidirectional Shift Register	/009 05
MC54195	4-Bit Parallel-Access Shift Register	/009 06
MC54H00	Quad 2-Input Positive NAND Gate (High-Speed)	/023 04
MC54H01	Quad 2-Input Positive NAND Gate (High-Speed, Open Collector Output)	/023 06
MC54H04	Hex 1-Input Inverter Gate (High-Speed)	/023 05
MC54H10	Triple 3-Input Positive NAND Gate (High-Speed)	/023 03
MC54H20	Dual 4-Input Positive NAND Gate (High-Speed)	/023 02
MC54H22	Dual 4-Input Positive NAND Gate (High-Speed, Open Collector Output)	/023 07
MC54H30	Single 8-Input Positive NAND Gate (High-Speed)	/023 01
MC54H40	Dual 4-Input Positive NAND Buffer (High-Speed)	/024 01
MC54H72	Single J-K Master-Slave Flip-Flop (High-Speed)	/022 01
MC54H73	Dual J-K Master-Slave Flip-Flop (High-Speed)	/022 02
MC54H74A	Dual D-Type Edge-Triggered Flip-Flop (High-Speed)	/022 03
MC54H76 *	Dual J-K Flip-Flop (High-Speed)	/022 04
MC54H101	J-K Edge-Triggered Flip-Flop (High-Speed)	/022 05
MC54H103	Dual J-K Edge-Triggered Flip-Flop (High-Speed)	/022 06
MC54L00 *	Quad 2-Input Positive NAND Gate (Low-Power)	/020 04
MC54L02 *	Quad 2-Input Positive NOR Gate (Low-Power)	/027 01
MC54L03 *	Quad 2-Input Positive NAND Gate (Low-Power, Open Collector Output)	/020 06
MC54L04 *	Hex 1-Input Inverter Gate (Low-Power)	/020 05
MC54L10 *	Triple 3-Input Positive NAND Gate (Low-Power)	/020 03
MC54L20 *	Dual 4-Input Positive NAND Gate (Low-Power)	/020 02
MC54L30 *	Single 8-Input Positive NAND Gate (Low-Power)	/020 01
MC54L42 *	BCD-to-Decimal Decoder (Low-Power)	/029 01
MC54L43 *	Excess-3-to-Decimal Decoder (Low-Power)	/029 02
MC54L44 *	Excess-3-Gray-to-Decimal Decoder (Low-Power)	/029 03
MC54L46 *	BCD-to-Seven-Segment Decoder/Driver (Low-Power, 30-Volt, Open Collector Output)	/029 04
MC54L47 *	BCD-to-Seven-Segment Decoder/Driver (Low-Power, 15-Volt, Open Collector Output)	/029 05
MC54L71 *	R-S Master-Slave Flip-Flop (Low-Power)	/021 01
MC54L72 *	J-K Master-Slave Flip-Flop (Low-Power)	/021 02
MC54L73 *	Dual J-K Master-Slave Flip-Flop (Low-Power)	/021 03
MC54L74 *	Dual D-Type Edge-Triggered Flip-Flop (Low-Power)	/021 05
MC54L78 *	Dual J-K Master-Slave Flip-Flop (Low-Power)	/021 04
MC54L86 *	Quad 2-Input Exclusive OR Gate (Low-Power)	/026 01
MC54L95 *	4-Bit Right-Shift, Left-Shift Register (Low-Power)	/028 01
MC54L164 *	8-Bit Parallel-Out Serial Shift Register (Low-Power)	/028 02
MC9309	Dual 4-Input Data Selector/Multiplexer, without Enable	/014 04
MC9312	8-Input Data Selector/Multiplexer, with Enable	/014 02
MC9322	Quad 2-Input Data Selector/Multiplexer, with Enable	/014 05
McMOS INTEGRATED CIRCUITS		
Motorola Standard Part No.	Description	JAN Part No.**
MC14000A	Dual 3-Input NOR Gate plus Inverter	/052 01
MC14001A	Quad 2-Input NOR Gate	/052 02
MC14002A	Dual 4-Input NOR Gate	/052 03
MC14006A	Dual 4-Stage/Dual 5-Stage Static Shift Register	/057 01
MC14007A	Dual Complementary Pair plus Inverter	/053 01

\* Not presently being manufactured or planned for immediate introduction.

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TABLE II – MOTOROLA PART NUMBER TO JAN PART NUMBER  
CROSS REFERENCE (Continued)

CMOS INTEGRATED CIRCUITS (Continued)		
Motorola Standard Part No.	Description	JAN Part No.**
MC14009A	Inverting Hex Buffer	/055 01
MC14010A	Non-Inverting Hex Buffer	/055 02
MC14011A	Quad 2-Input NAND Gate	/050 01
MC14012A	Dual 4-Input NAND Gate	/050 02
MC14013A	Dual D-Type Edge-Triggered Flip-Flop	/051 01
MC14014A *	8-Stage Synchronous Parallel or Serial Input/Serial Output Static Shift Register	/057 02
MC14015A	Dual 4-Stage Serial Input/Parallel Output Static Shift Register	/057 03
MC14016A	Quad Analog Switch/Quad Multiplexer	/058 01
MC14017A	Decade Counter/Divider	/056 01
MC14018A *	Presettable Divide-by-N Counter	/056 02
MC14019A *	Quad AND-OR-Select Gate	/053 02
MC14020A	14-Stage Ripple-Carry Binary Counter/Divider	/056 03
MC14021A	8-Stage Asynchronous Parallel Input/Serial Output or Synchronous Serial Input/Serial Output Static Shift Register	/057 04
MC14022A	Divide-by-8 Counter/Divider	/056 04
MC14023A	Triple 3-Input NAND Gate	/050 03
MC14024A	7-Stage Binary Counter	/056 05
MC14025A	Triple 3-Input NOR Gate	/052 04
MC14027A	Dual J-K Master-Slave Flip-Flop	/051 02
MC14031A *	64-Stage Static Shift Register with Delayed Clock Output and Recirculation Capability	/057 05
MC14049A	Hex Buffer	/055 03
MC14050A	Hex Buffer	/055 04
LINEAR INTEGRATED CIRCUITS		
Motorola Standard Part No.	Description	JAN Part No.**
MC1710	Single Differential Voltage Comparator	/103 01
MC1711	Dual Channel Differential Voltage Comparator	/103 02
MC1723	Precision Voltage Regulator	/102 01
MC1733	Video Amplifier	/105 01
MC1741	Single Operational Amplifier (Internally Compensated)	/101 01
MC1747	Dual Operational Amplifier (Internally Compensated)	/101 02
MC55107	Dual Line Receiver	/104 01
MC55108	Dual Line Receiver (Open Collector Output)	/104 02
MLM101A	Single Operational Amplifier (Externally Compensated)	/101 03
MLM102 *	Voltage Follower Operational Amplifier	/106 01
MLM106 *	Single Voltage Comparator/Buffer	/103 03
MLM108A	Single Operational Amplifier (Externally Compensated)	/101 04
MLM110	Voltage Follower Operational Amplifier	/106 02
MEMORIES		
Motorola Standard Part No.	Description	JAN Part No.**
MCM5303	64-Word/8-Bits-per-Word PROM (Open Collector Output)	/201 01
MCM5304	64-Word/8-Bits-per-Word PROM (Internal Pullup Resistor)	/201 02

\* Not presently being manufactured or planned for immediate introduction.

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ORIGINAL ARTICLES

**THE EFFECT OF VITAMIN C ON THE BLOOD SUGAR LEVEL IN THE RAT**  
J. H. HARRIS, JR., M.D., and J. H. HARRIS, JR., M.D.  
From the Department of Medicine, University of Chicago, Chicago, Ill.  
(Received for consideration, February 10, 1936; accepted for publication, March 10, 1936.)

The effect of vitamin C on the blood sugar level in the rat has been studied by Harris and Harris. The results show that the administration of vitamin C to rats causes a significant increase in the blood sugar level. This effect is more pronounced in rats that are deficient in vitamin C. The authors suggest that this effect may be due to the action of vitamin C on the liver, which is the main source of glucose in the body. The study was conducted using a method of measuring the blood sugar level in the rat by the use of a special apparatus. The results were compared with those obtained from rats that were not given vitamin C. The authors conclude that the administration of vitamin C to rats causes a significant increase in the blood sugar level, and that this effect is more pronounced in rats that are deficient in vitamin C.

4

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# SELECTION GUIDES

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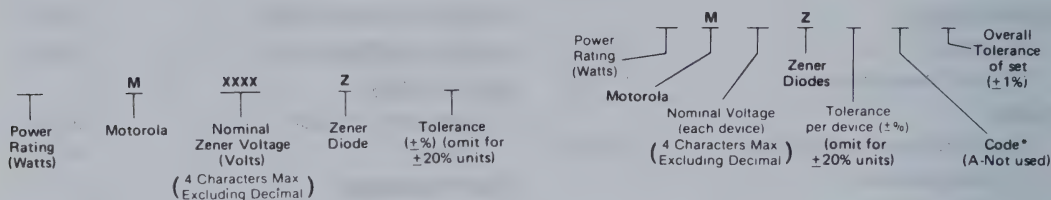
## ZENER DIODE DEVICE OPTION

Motorola manufactures a complete line of zener diodes. The following pages describe the many device types available as standard products that are stocked at the factory warehouse and with distributors. Although Motorola standard zener diodes will handle most of the industry's needs, they represent only a small fraction of the devices that can be supplied. In cases where a non-standard set of specifications is required, the appropriate device can be selected and ordered from the following device options.

### NON-STANDARD ZENER DIODES SPECIAL VOLTAGE AND TOLERANCE RATINGS

JEDEC "1N" type numbers denote a specific Zener voltage, power rating, and tolerance. For example, JEDEC type 1N4728 is a standard 1 watt diode, rated at 3.3 volts  $\pm 10\%$ . A suffix "A" on this type number indicates a  $\pm 5\%$  voltage tolerance.

Special Motorola devices, with a choice of voltages and tolerances are also available. The following diagram explains the Motorola coding system:



For example, the code for a special 10 watt Zener diode with a voltage of 41 volts and a tolerance of  $\pm 1\%$  would be: 10M41Z1.

Following is a list of other standard Motorola symbols for special Zener orders (X's indicate nominal Zener voltage):

#### BASIC MOTOROLA TYPE

#### DEVICE DESCRIPTION

¼MXXXXAZ5	250 mW Alloy Glass, $\pm 5\%$
¼MXXXXZ5	250 mW Glass, $\pm 5\%$
.4MXXXXAZ5	400 mW Alloy Glass, $\pm 5\%$
.4MXXXXZ10	400 mW Glass, $\pm 10\%$
.5MXXXXZS10	500 mW Surmetic, $\pm 10\%$
1MXXXXAZ10	1 Watt Alloy Flangeless, $\pm 10\%$
1MXXXXZ10	1 Watt Flangeless, $\pm 10\%$
1MXXXXZS5	1 Watt Surmetic, $\pm 5\%$
1.5MXXXXZ	1.5 Watt, $\pm 20\%$
5MXXXXZS5	5 Watt Surmetic, $\pm 5\%$
10MXXXXAZ5	10 Watt Alloy Stud, $\pm 5\%$
10MXXXXZ10	10 Watt Stud, $\pm 10\%$
50MXXXXAZ10	50 Watt Alloy TO-3, $\pm 10\%$
50MXXXXASZ5	50 Watt Alloy Stud, $\pm 5\%$
50MXXXXZ	50 Watt TO-3, $\pm 20\%$
50MXXXXSZ5	50 Watt Stud, $\pm 5\%$

For reverse polarities (10 W and 50W), insert "R" before tolerance, i.e., 50M110SZR5.

1N5518 thru 1N5546 — This series may be ordered in  $\pm 2\%$  and  $\pm 1\%$  tolerance by adding the following suffix:

C =  $\pm 2\%$

D =  $\pm 1\%$

For example, the 1N5518D would be the same as the 1N5518B except  $V_Z = 3.3 \pm 1\%$ .

### MATCHED SETS OF ZENER DIODES

Zener diodes can also be obtained in sets consisting of two or more matched devices. The method for specifying such matched sets is similar to the one described for specifying units with a special voltage and/or tolerance except that two extra suffixes are added to the code number described above.

These units are marked with code letters to identify the matched sets and in addition, each unit in a set is marked with the same serial number which is different for each set being ordered.

#### \*Code

- B — Two devices in series
- C — Three devices in series
- D — Four devices in series
- E — Five devices in series
- F — Six devices in series
- G — Seven devices in series
- H — Eight devices in series
- P — Two devices in parallel (not recommended)
- X — Two devices; one standard polarity, the other reverse polarity. (10 and 50 watts only)

i.e., 10M51Z5B1 is for two 10 watt zeners, each of 51 volts,  $\pm 5\%$ , matched to a total voltage of 102 volts  $\pm 1\%$ .

### ORDERING OF MATCHED SETS

Order per instructions in "Matched Sets of Zener Diodes" or else specify the following:

- Type of matched set (series or parallel)
- Number of units per set
- Device type (with proper suffix to indicate tolerance)
- Number of sets required
- Total voltage and overall tolerance of the set

### ADDITIONAL NOTES

Consult factory for pricing and ordering information on special sets. For example: 1) Sets with overall tolerance different from those shown; 2) Matched sets of temperature compensated devices; 3) Sets which require basic device types within the set to be different from each other; 4) Sets with device type nominal voltages outside the range of the Zener family involved; 5) Tight tolerance temperature compensated diodes.



## ZENER CHIPS (MZC)

1. The nomenclature for Zener Chips is as follows:



### BASIC TYPE MOTOROLA NOMENCLATURE

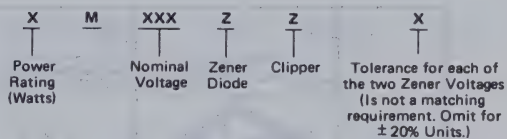
### DEVICE DESCRIPTION

MZCXXAX	Zener Chip — "A" Series, High Level
MZCXXBX	Zener Chip — "B" Series, Low Level

2. Chips are sold in increments of ten (10) only
3. Chips are **not** sold as matched sets or clippers.
4. A ".1" suffix will cause all chips ordered to be supplied in Dek-Pak.

## ZENER CLIPPERS

Special clipper diodes with opposing Zener junctions built into the devices are available by using the following nomenclatures:



This nomenclature is applicable to all packages and power ratings as restricted in the above paragraphs.

## ORDERING INFORMATION

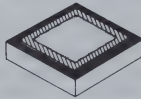




Order using the above nomenclature or else specify the device type, nominal voltage and tolerance required.



# ZENER DIODES

The devices listed in the following tables represent a basic profile of the largest inventoried Zener diode line in the industry. These diodes may be employed where a nearly constant dc output voltage is required despite relatively large changes in input voltage or load

resistance. Motorola's devices represent state-of-the-art with the superior capability of silicon-oxide passivated junction for low leakage, sharp breakdowns and long-term stability.

Nominal  Zener  Voltage	CHIPS (25 Mils Square) Cathode = Bottom Surface		250 MILLIWATT (400 mW Package) Cathode = Polarity Mark	400 MILLIWATT Cathode = Polarity Mark		500 MILLIWATT Cathode = Polarity Mark	
							
	MZC		GLASS CASE 51 (DO-7)	GLASS CASE 51 (DO-7)	Surmetic CASE 182 (TO-92)	Surmetic 20 CASE 51 (DO-7)	
	HIGH LEVEL (NOTE 7)	LOW LEVEL (NOTE 7)	INDUSTRIAL ±5% TOLERANCE LOW NOISE LOW LEVEL	CONSUMER INDUSTRIAL (NOTE 2, 3, 8)	INDUSTRIAL LOW VOLTAGE AVALANCHE	CONSUMER INDUSTRIAL (NOTE 3.5b)	CONSUMER INDUSTRIAL (NOTE 5a)
(NOTE 1, 6)							
1.8		MZC1.8B10	MZ4614				
2.0		MZC2.0B10	MZ4615				
2.2		MZC2.2B10	MZ4616				
2.4	MZC2.4A10	MZC2.4B10	MZ4617	1N4370		1N5837A	1N5221
2.7	MZC2.7A10	MZC2.7B10	MZ4618	1N4371		1N5839A	1N5223
3.0	MZC3.0A10	MZC3.0B10	MZ4619	1N4372		1N5841A	1N5225
3.3	MZC3.3A10	MZC3.3B10	MZ4620	1N746	1N5518	1N5842A	1N5226
3.6	MZC3.6A10	MZC3.6B10	MZ4621	1N747	1N5519	1N5843A	1N5227
3.9	MZC3.9A10	MZC3.9B10	MZ4622	1N748	1N5520	1N5844A	1N5228
4.3	MZC4.3A10	MZC4.3B10	MZ4623	1N749	1N5521	1N5845A	1N5229
4.7	MZC4.7A10	MZC4.7B10	MZ4624	1N750	1N5522	1N5846A	1N5230
5.1	MZC5.1A10	MZC5.1B10	MZ4625	1N751	1N5523	1N5847A	1N5231
5.6	MZC5.6A10	MZC5.6B10	MZ4626	1N752	1N5524	1N5848A	1N5232
6.2	MZC6.2A10	MZC6.2B10	MZ4627	1N753	1N5525	1N5850A	1N5234
6.8	MZC6.8A10	MZC6.8B10	1N4099	1N754 1N957	1N5526	1N5851A	1N5235
7.5	MZC7.5A10	MZC7.5B10	1N4100	1N755 1N958	1N5527	1N5852A	1N5236
8.2	MZC8.2A10	MZC8.2B10	1N4101	1N756 1N959	1N5528	1N5853A	1N5237
9.1	MZC9.1A10	MZC9.1B10	1N4103	1N757 1N960	1N5529	1N5855A	1N5239
10	MZC10A10	MZC10B10	1N4104	1N758 1N961	1N5530	1N5856A	1N5240
11	MZC11A10	MZC11B10	1N4105	1N962	1N5531	1N5857A	1N5241
12	MZC12A10	MZC12B10	1N4106	1N759 1N963	1N5532	1N5858A	1N5242
13	MZC13A10	MZC13B10	1N4107	1N964	1N5533	1N5859A	1N5243
15	MZC15A10	MZC15B10	1N4109	1N965	1N5535	1N5861A	1N5245
16	MZC16A10	MZC16B10	1N4110	1N966	1N5536	1N5862A	1N5246
18	MZC18A10	MZC18B10	1N4112	1N967	1N5538	1N5864A	1N5248
20	MZC20A10	MZC20B10	1N4114	1N968	1N5540	1N5866A	1N5250
22	MZC22A10	MZC22B10	1N4115	1N969	1N5541	1N5867A	1N5251
24	MZC24A10	MZC24B10	1N4116	1N970	1N5542	1N5868A	1N5252
27	MZC27A10	MZC27B10	1N4118	1N971		1N5870A	1N5254
30	MZC30A10	MZC30B10	1N4120	1N972	1N5545	1N5872A	1N5256
33	MZC33A10	MZC33B10	1N4121	1N973	1N5546	1N5873A	1N5257
36	MZC36A10	MZC36B10	1N4122	1N974		1N5874A	1N5258
39	MZC39A10	MZC39B10	1N4123	1N975		1N5875A	1N5259
43	MZC43A10	MZC43B10	1N4124	1N976		1N5876A	1N5260
47	MZC47A10	MZC47B10	1N4125	1N977		1N5877A	1N5261
51	MZC51A10	MZC51B10	1N4126	1N978		1N5878A	1N5262
56	MZC56A10	MZC56B10	1N4127	1N979		1N5879A	1N5263
62	MZC62A10	MZC62B10	1N4129	1N980		1N5881A	1N5265
68	MZC68A10	MZC68B10	1N4130	1N981		1N5882A	1N5266
75	MZC75A10	MZC75B10	1N4131	1N982		1N5883A	1N5267
82	MZC82A10	MZC82B10	1N4132	1N983		1N5884A	1N5268
91	MZC91A10	MZC91B10	1N4134	1N984		1N5886A	1N5270
100	MZC100A10	MZC100B10	1N4135	1N985		1N5887A	1N5271
110	MZC110A10	MZC110B10		1N986		1N5888A	1N5272
120	MZC120A10	MZC120B10		1N987		1N5889A	1N5273
130	MZC130A10	MZC130B10		1N988		1N5891A	1N5274
150	MZC150A10	MZC150B10		1N989		1N5892A	1N5276
160	MZC160A10	MZC160B10		1N990		1N5893A	1N5277
180	MZC180A10	MZC180B10		1N991		1N5895A	1N5279
200	MZC200A10	MZC200B10		1N992		1N5897A	1N5281

NOTES: 1. The Zener Voltage is measured at approximately 1/4 the rated power except for the MZ4614 and 1N4099 series. This series is measured with an  $I_{ZT} = 250 \mu\text{A}$ dc. The 1N4370 and 1N746 series is measured with an  $I_{ZT} = 20 \text{ mA}$ dc.  
2. No suffix denotes  $\pm 10\%$  tolerance. "A" suffix is  $\pm 5.0\%$  tolerance. (1N4370-4372, 1N746-759; 1N3821-30, 1N3993-4000, 1N4728-64).








3. No suffix is  $\pm 20\%$  tolerance. "A" suffix is  $\pm 10\%$  tolerance, and "B" suffix is  $\pm 5.0\%$  tolerance. (1N957-992; 1N3016-3061; 1N3785-3820; 1N2970&R-3015&R; 1N4549&R-4556&R; 1N4557&R-4564&R; 1N3305&R-3330&R; 1N5333-1N5338).

Other Standard Voltages Available:

2.5, 2.8, 6.0, 8.7, 14, 17, 19, 25, 28, 60, 87, 140, 150, and 190.



ZENER DIODES (continued)

1 WATT	1WATT	1-1/2 WATT	5 WATT	10 WATT	50 WATT		Nominal Zener Voltage
Cathode - Polarity Mark	Cathode to Case	Cathode to Case	Cathode - Polarity Mark	Cathode to Case = 1N3993 series Anode to Case = 1N2970 series	Anode to Case		
 Surmetic 30 CASE 59 (DO-41)	 CASE 52 (DO-13)	 CASE 55	 Surmetic 40 CASE 17	 CASE 56 (DO-4)	 CASE 54 (TO-3)	 CASE 58 (DO-5)	
CONSUMER INDUSTRIAL (NOTE 2)	CONSUMER INDUSTRIAL (NOTE 2, 3, 9)	INDUSTRIAL (NOTE 3)	INDUSTRIAL (NOTE 3)	INDUSTRIAL (NOTE 2, 3, 4, 10)	INDUSTRIAL (NOTE 3, 4)	INDUSTRIAL (NOTE 3, 4)	(NOTE 1, 6)
							1.8 2.0 2.2 2.4 2.7 3.0 3.3 3.6 3.9
1N4728 1N4729 1N4730	1N3821 1N3822 1N3823		1N5333 1N5334 1N5335	1N3993&R	1N4557&R	1N4549&R	4.3 4.7 5.1 5.6 6.2
1N4731 1N4732 1N4733 1N4734 1N4735	1N3824 1N3825 1N3826 1N3827 1N3828		1N5336 1N5337 1N5338 1N5339 1N5341	1N3994&R 1N3995&R 1N3996&R 1N3997&R 1N3998&R	1N4558&R 1N4559&R 1N4560&R 1N4561&R 1N4562&R	1N4550&R 1N4551&R 1N4552&R 1N4553&R 1N4554&R	6.8
1N4736	1N3829 1N3016	1N3785	1N5342	1N3999&R 1N2970&R	1N4563&R 1N2804&R	1N4555&R 1N3305&R	7.5
1N4737	1N3830 1N3017	1N3786	1N5343	1N4000&R 1N2971&R	1N4564&R 1N2805&R	1N4556&R 1N3306&R	8.2
1N4738	1N3018	1N3787	1N5344	1N2972&R	1N2806&R	1N3307&R	9.1
1N4739	1N3019	1N3788	1N5346	1N2973&R	1N2807&R	1N3308&R	10
1N4740	1N3020	1N3789	1N5347	1N2974&R	1N2808&R	1N3309&R	11
1N4741	1N3021	1N3790	1N5348	1N2975&R	1N2809&R	1N3310&R	12
1N4742	1N3022	1N3791	1N5349	1N2976&R	1N2810&R	1N3311&R	13
1N4743 1N4744 1N4745 1N4746 1N4747 1N4748	1N3023 1N3024 1N3025 1N3026 1N3027 1N3028	1N3792 1N3793 1N3794 1N3795 1N3796 1N3797	1N5350 1N5352 1N5353 1N5355 1N5357 1N5358	1N2977&R 1N2979&R 1N2980&R 1N2982&R 1N2984&R 1N2985&R	1N2811&R 1N2813&R 1N2814&R 1N2816&R 1N2818&R 1N2819&R	1N3312&R 1N3314&R 1N3315&R 1N3317&R 1N3319&R 1N3320&R	14 15 16 18 20 22
1N4749 1N4750 1N4751 1N4752 1N4753 1N4754	1N3029 1N3030 1N3031 1N3032 1N3033 1N3034	1N3798 1N3799 1N3800 1N3801 1N3802 1N3803	1N5359 1N5361 1N5363 1N5364 1N5365 1N5366	1N2986&R 1N2988&R 1N2989&R 1N2990&R 1N2991&R 1N2992&R	1N2820&R 1N2822&R 1N2823&R 1N2824&R 1N2825&R 1N2826&R	1N3321&R 1N3323&R 1N3324&R 1N3325&R 1N3326&R 1N3327&R	24 27 30 33 36 39
1N4755 1N4756 1N4757 1N4758 1N4759 1N4760	1N3035 1N3036 1N3037 1N3038 1N3039 1N3040	1N3804 1N3805 1N3806 1N3807 1N3808 1N3809	1N5367 1N5368 1N5369 1N5370 1N5372 1N5373	1N2993&R 1N2996&R 1N2997&R 1N2998&R 1N3000&R 1N3001&R	1N2827&R 1N2829&R 1N2831&R 1N2832&R 1N2833&R 1N2834&R	1N3328&R 1N3330&R 1N3332&R 1N3334&R 1N3335&R 1N3336&R	43 47 51 56 62 68
1N4761 1N4762 1N4763 1N4764	1N3041 1N3042 1N3043 1N3044	1N3810 1N3811 1N3812 1N3813	1N5374 1N5375 1N5377 1N5378	1N3002&R 1N3003&R 1N3004&R 1N3005&R	1N2835&R 1N2836&R 1N2837&R 1N2838&R	1N3337&R 1N3338&R 1N3339&R 1N3340&R	75 82 91 100
1M1102S10 1M1202S10	1N3045 1N3046	1N3814 1N3815	1N5379 1N5380	1N3007&R 1N3008&R	1N2840&R 1N2841&R	1N3342&R 1N3343&R	110 120
1M1302S10 1M1502S10 1M1602S10 1M1802S10 1M2002S10	1N3047 1N3048 1N3049 1N3050 1N3051	1N3816 1N3817 1N3818 1N3819 1N3820	1N5381 1N5383 1N5384 1N5386 1N5388	1N3009&R 1N3011&R 1N3012&R 1N3014&R 1N3015&R	1N2842&R 1N2843&R 1N2844&R 1N2845&R 1N2846&R	1N3344&R 1N3346&R 1N3347&R 1N3349&R 1N3350&R	130 150 160 180 200

4. R, RA & RB = Reverse Polarity Types Available.

5a. No suffix is  $\pm 10\%$  tolerance, "A" suffix is  $\pm 10\%$  tolerance, "B" suffix is  $\pm 5.0\%$  tolerance.

5b. "C" suffix is  $\pm 2.0\%$  tolerance.

"D" suffix is  $\pm 1.0\%$  tolerance.

6. Contact your Motorola Semiconductor Representative for information on intermediate voltages and tighter tolerances.
7. For a 5, 3, 2, or 1%, change the suffix "10" to the desired tolerance.

JAN/JANTX available  $\pm 5.0\%$  only.

Reverse polarity available on 10W and 50W devices.

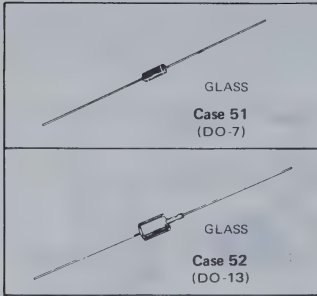
8. 1N746A to 1N973B NASA Types Available.

9. 1N3016B to 1N3051B NASA Types Available.

10. 1N2970B to 1N2985B and 1N2918B NASA Types Available



# ZENER REFERENCE DIODES



For applications in which the output voltage must remain within narrow limits during changes in input voltage, load resistance, and temperature changes. These Temperature Compensated Zener Reference Diodes have low dynamic impedance and silicon oxide passivated junctions for long-term stability.

Motorola guarantees all reference diodes to fall within specified maximum voltage variations over the indicated temperature range at a specific test current. This method complies with JEDEC suggested Standard No. 5 and has been incorporated into all reference diode military specifications. Note that ratings are maximum only and do not reflect the actual voltage change exhibited by an individual unit. The temperature coefficient is shown for reference and should not be considered as a maximum rating. The reference diode temperature coefficient is not a linear characteristic, and therefore accurately reflects the voltage deviation at test temperature extremes only. Devices are tested at the various temperature points while exposed to an air environment which eliminates unwanted boundary effects prevalent in oil bath testing. Voltage-time stability, although, not specified is normally better than 100 PPM per 1000 hours of operation, however, for critical applications precision reference diodes are available with guaranteed voltage-time stability of less than 5 PPM per 1000 hours.

			AVERAGE TEMPERATURE COEFFICIENT OVER THE OPERATING TEMPERATURE RANGE										
			0.01 %/°C		0.005 %/°C		0.002 %/°C		0.001 %/°C		0.0005 %/°C		
Reference Voltage	Test Current mA <sub>dc</sub>	Operating Temp. Range, °C	Device Type	ΔV <sub>Z</sub> max Volts	Device Type	ΔV <sub>Z</sub> max Volts	Device Type	ΔV <sub>Z</sub> max Volts	Device Type	ΔV <sub>Z</sub> max Volts	Device Type	ΔV <sub>Z</sub> max Volts	Case Type
6.2 Δ	7.5	-55, 0, +25, +75, +100	*1N821,J,TX	0.096	*1N823,J,TX	0.048	*1N825,J,TX	0.019	*1N827,J,TX	0.009	*1N829,J,TX	0.005	51
6.2 Δ	7.5	-55, 0, +25, +75, +100	*1N821A	0.096	*1N823A	0.048	*1N825A	0.019	*1N827A	0.009	*1N829A	0.005	
6.4	0.5	0, +25, +75	1N4565	0.048	1N4566	0.024	1N4567	0.010	1N4568	0.005	1N4569	0.002	
	0.5	-55, 0, +25, +75, +100	1N4565A	0.099	1N4566A	0.050	1N4567A	0.020	1N4568A	0.010	1N4569A	0.005	
	1.0	0, +25, +75	1N4570	0.048	1N4571	0.024	1N4572	0.010	1N4573	0.005	1N4574	0.002	
	1.0	-55, 0, +25, +75, +100	1N4570A	0.099	1N4571A	0.050	1N4572A	0.020	1N4573A	0.010	1N4574A	0.005	
	2.0	0, +25, +75	1N4575	0.048	1N4576	0.024	1N4577	0.010	1N4578	0.005	1N4579	0.002	
	2.0	-55, 0, +25, +75, +100	1N4575A	0.099	1N4576A	0.050	1N4577A	0.020	1N4578A	0.010	1N4579A	0.005	
	4.0	0, +25, +75	1N4580	0.048	1N4581	0.024	1N4582	0.010	1N4583	0.005	1N4584	0.002	
	4.0	-55, 0, +25, +75, +100	1N4580A	0.099	1N4581A	0.050	1N4582A	0.020	1N4583A	0.010	1N4584A	0.005	
8.4	10.0	-55, 0, +25, +75, +100	*1N3154,J,TX	0.130	*1N3155,J,TX	0.065	*1N3156,J,TX	0.026	*1N3157,J,TX	0.013			
	8.4	-55, 0, +25, +75, +100, +150	*1N3154A	0.172	*1N3155A	0.086	*1N3156A	0.034	*1N3157A	0.017			
8.5	0.5	0, +25, +75	1N4775	0.064	1N4776	0.032	1N4777	0.013	1N4778	0.006	1N4779	0.003	
	0.5	-55, 0, +25, +75, +100	1N4775A	0.132	1N4776A	0.066	1N4777A	0.026	1N4778A	0.013	1N4779A	0.007	
	1.0	0, +25, +75	1N4780	0.064	1N4781	0.032	1N4782	0.013	1N4783	0.006	1N4784	0.003	
	1.0	-55, 0, +25, +75, +100	1N4780A	0.132	1N4781A	0.066	1N4782A	0.026	1N4783A	0.013	1N4784A	0.007	
9.0	7.5	0, +25, +75	*1N935	0.067	*1N936	0.033	*1N937	0.013	*1N938	0.006	*1N939	0.003	
		-55, 0, +25, +75, +100	*1N935A	0.139	*1N936A	0.069	*1N937A	0.027	*1N938A	0.013	*1N939A	0.007	
9.1	0.5	-55, 0, +25, +75, +100, +150	*1N935B,J,TX	0.184	*1N936B	0.092	*1N937B,J,TX	0.037	*1N938B,J,TX	0.018	*1N939B,J,TX	0.009	
		0, +25, +75	1N4765	0.068	1N4766	0.034	1N4767	0.014	1N4768	0.007	1N4769	0.003	
		-55, 0, +25, +75, +100	1N4765A	0.141	1N4766A	0.070	1N4767A	0.028	1N4768A	0.014	1N4769A	0.007	
		0, +25, +75	1N4770	0.068	1N4771	0.034	1N4772	0.014	1N4773	0.007	1N4774	0.003	
		-55, 0, +25, +75, +100	1N4770A	0.141	1N4771A	0.070	1N4772A	0.028	1N4773A	0.014	1N4774A	0.007	
9.3	10.0	0, +25, +75	1N2620	0.070	1N2621	0.035	1N2622	0.014	1N2623	0.007	1N2624	0.003	52
		-55, 0, +25, +75, +100	1N2620A	0.144	1N2621A	0.072	1N2622A	0.029	1N2623A	0.014	1N2624A	0.007	
		-55, 0, +25, +75, +100, +150	1N2620B	0.191	1N2621B	0.095	1N2622B	0.038	1N2623B	0.019	1N2624B	0.010	
9.4±0.4 (Suffix "A" ±0.2 V)	10.0	0, +25, +70			1N2163A	0.033			1N2166A	0.007	1N2169A	0.004	
		-55, 0, +25, +75, +125			1N2164A	0.086			1N2167A	0.017	1N2170A	0.009	
		-55, 0, +25, +75, +125, +185			1N2165A	0.115			1N2168A	0.023	1N2171A	0.012	
11.7	7.5	0, +25, +75	*1N941	0.088	*1N942	0.044	*1N943	0.018	*1N944	0.009	*1N945	0.004	51
		-55, 0, +25, +75, +100	*1N941A	0.181	*1N942A	0.090	*1N943A	0.036	*1N944A	0.018	*1N945A	0.009	
		-55, 0, +25, +75, +100, +150	*1N941B,J,TX	0.239	*1N942B	0.120	*1N943B,J,TX	0.047	*1N944B,J,TX	0.024	*1N945B,J,TX	0.012	
11.7	7.5	0, +25, +75	1N3580	0.088	1N3581	0.044	1N3582	0.018	1N3583	0.009			52
		-55, 0, +25, +75, +100	1N3580A	0.181	1N3581A	0.090	1N3582A	0.036	1N3583A	0.018			
		-55, 0, +75, +100, +150	1N3580B	0.239	1N3581B	0.120	1N3582B	0.047	1N3583B	0.024			
12.8	0.5	+25, +75, +100	1N4896	0.096	1N4897	0.048	1N4898	0.019	1N4899	0.010			51
	0.5	-55, 0, +25, +75, +100	1N4896A	0.198	1N4897A	0.099	1N4898A	0.040	1N4899A	0.020			
	1.0	+25, +75, +100	1N4900	0.096	1N4901	0.048	1N4902	0.019	1N4903	0.010			
	1.0	-55, 0, +25, +75, +100	1N4900A	0.198	1N4901A	0.099	1N4902A	0.040	1N4903A	0.020			
	2.0	+25, +75, +100	1N4904	0.096	1N4905	0.048	1N4906	0.019	1N4907	0.010			
	2.0	-55, 0, +25, +75, +100	1N4904A	0.198	1N4905A	0.099	1N4906A	0.040	1N4907A	0.020			
	4.0	+25, +75, +100	1N4908	0.096	1N4909	0.048	1N4910	0.019	1N4911	0.010			
	4.0	-55, 0, +25, +75, +100	1N4908A	0.198	1N4909A	0.099	1N4910A	0.040	1N4911A	0.020			
	7.5	+25, +75, +100	1N4912	0.096	1N4913	0.048	1N4914	0.019	1N4915	0.010			
	7.5	-55, 0, +25, +75, +100	1N4912A	0.198	1N4913A	0.099	1N4914A	0.040	1N4915A	0.020			
	19.2	0.5	+25, +75, +100	1N4916	0.144	1N4917	0.072	1N4918	0.029				51
		0.5	-55, 0, +25, +75, +100	1N4916A	0.298	1N4917A	0.149	1N4918A	0.060				
		1.0	+25, +75, +100	1N4919	0.144	1N4920	0.072	1N4921	0.029				
		1.0	-55, 0, +25, +75, +100	1N4919A	0.298	1N4920A	0.149	1N4921A	0.060				
		2.0	+25, +75, +100	1N4922	0.144	1N4923	0.072	1N4924	0.029				
		2.0	-55, 0, +25, +75, +100	1N4922A	0.298	1N4923A	0.149	1N4924A	0.060				
4.0		+25, +75, +100	1N4925	0.144	1N4926	0.072	1N4927	0.029	1N4928	0.014			
4.0		-55, 0, +25, +75, +100	1N4925A	0.298	1N4926A	0.149	1N4927A	0.060	1N4928A	0.030			
7.5	+25, +75, +100	1N4929	0.144	1N4930	0.072	1N4931	0.029	1N4932	0.014				
7.5	-55, 0, +25, +75, +100	1N4929A	0.298	1N4930A	0.149	1N4931A	0.060	1N4932A	0.030				

Δ Non-suffix - Z<sub>TT</sub> = 15 Ω, "A" Suffix - Z<sub>TT</sub> = 10 Ω

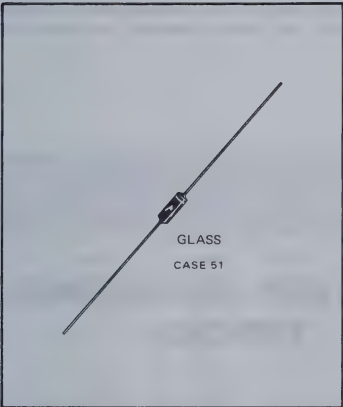
\* Radiation Resistant Devices Available; to order, specify MZ821, A or B in lieu of '1N' prefix.

Not Applicable to J or TX devices.



# PRECISION REFERENCE DIODES

Designed, manufactured, and tested for use in computers, inertial guidance systems, and precision equipment requiring ultra-high stability of voltage over changes of time and temperature. All precision testing equipment is housed in a double electrically shielded enclosure designed to eliminate reading errors caused by noise and interference. Equipment calibration is maintained relative to standard cells directly traceable to the National Bureau of Standards. A special power supply, having an absolute accuracy of  $\pm 0.003\%$  is used. Voltage measurements are made in air using automated equipment having a 1.0 microvolt resolution and an overall accuracy of better than 1 PPM. This procedure negates the boundary effects problem prevalent in oil bath testing.



## CERTIFIED TEST DATA

Every Motorola Precision Reference Diode is individually serialized and its test data recorded on a Certificate of Precision that accompanies the device when shipped. This data shows:

- Device voltages at each test temperature (+25, +75 and +100°C)
- Voltage stability within the measuring temperature range
- Actual device voltage at 168 hour intervals during verification test
- Voltage stability throughout the entire 1000 hour test period
- Certification of Precision
- All diodes are marked with the device type number, polarity band and serial number.

CERTIFIED VOLTAGE TIME STABILITY OVER 1000 HOURS OF OPERATION (Parts / Million Change)													
Reference Voltage Volts	Test Current MA	Temperature Stability		< 5 PPM/1000 HR		< 10 PPM/1000 HR		< 20 PPM/1000 HR		< 40 PPM/1000 HR		< 100 PPM/1000 HR	
		$\Delta V_2$ (MV)	OP Temp Range °C	Device Type	Change $\mu$ V Max	Device Type	Change $\mu$ V Max	Device Type	Change $\mu$ V Max	Device Type	Change $\mu$ V Max	Device Type	Change $\mu$ V Max
6.245%	7.5	2.5	25, 75, 100	MZ605	30	MZ610	60	MZ620	120	MZ640	240		
8.4 $\pm$ 5%	10.0	3.5	25, 75, 100	MZ805	45	MZ810	90	MZ820	180	MZ840	360		
6.35 $\pm$ 5%	7.5	2.5	25 to 100			1N4895	64	1N4893	127			1N4891	318
		5.0	-55 to 100			1N4895A	64	1N4893A	127			1N4891A	318
		5.0	25 to 100			1N4894	64	1N4892	127			1N4890	318
		10.0	-55 to 100			1N4894A	64	1N4892A	127			1N4890A	318
6.2-6.5	7.5	3.0	25 to 100									1N3502	636
6.2-6.5	7.5	6.0	25 to 100					1N3504	127	1N3503	318	1N3501	636

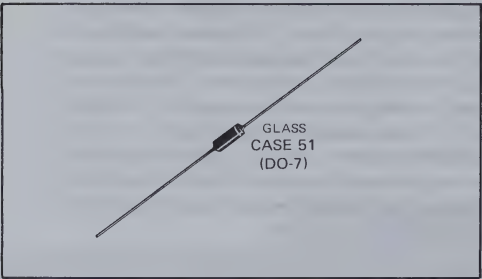
The time stability of the MOTOROLA MZ605 series and MZ805 series is determined by the difference between any two readings taken at 168 hour intervals during the 1000-hour operating stability test. The time stability of the JEDEC registered 1N XXXX devices is determined by the difference between the zero hour reading and any subsequent measurement taken at 168 hour intervals during the 1000-hour stability test.

$\Delta$  < 50 PPM time stability on these devices



# CURRENT REGULATOR DIODES

These diodes present a constant current regardless of the terminal voltage over a wide operating range and appears as a very high circuit impedance. These devices are useful for a number of electronic applications, including overcurrent protection, transistor biasing, linear ramp and staircase generators, differential amplifiers, precision reference voltage sources, and linear-scale ohmmeters, to name a few.



ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)  
POV = 100 Volt max

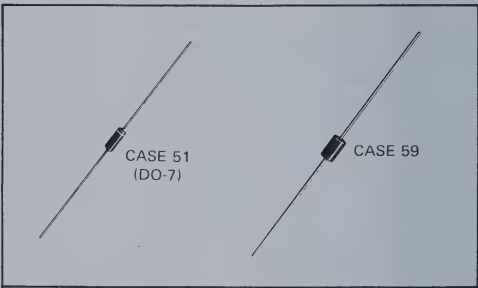
Regulator Current $\pm 10\%$ $V_T = 25\text{ V}$ $I_P \text{ mA (nom)}$	Device Type	Minimum Knee Impedance $@V_K = 6.0\text{ V}$ $Z_K (\text{M}\Omega)$	Maximum Limiting Voltage $@I_L = 0.8\text{ I}_P \text{ (min)}$ $V_L \text{ (Volts)}$
0.22	1N5283	2.75	1.00
0.24	1N5284	2.35	1.00
0.27	1N5285	1.95	1.00
0.30	1N5286	1.60	1.00
0.33	1N5287	1.35	1.00
0.39	1N5288	1.00	1.05
0.43	1N5289	0.870	1.05
0.47	1N5290	0.750	1.05
0.56	1N5291	0.560	1.10
0.62	1N5292	0.470	1.13
0.68	1N5293	0.400	1.15
0.75	1N5294	0.335	1.20
0.82	1N5295	0.290	1.25
0.91	1N5296	0.240	1.29
1.00	1N5297	0.205	1.35
1.10	1N5298	0.180	1.40
1.20	1N5299	0.155	1.45
1.30	1N5300	0.135	1.50
1.40	1N5301	0.115	1.55
1.50	1N5302	0.105	1.60
1.60	1N5303	0.092	1.65
1.80	1N5304	0.074	1.75
2.00	1N5305	0.061	1.85
2.20	1N5306	0.052	1.95
2.40	1N5307	0.044	2.00
2.70	1N5308	0.035	2.15
3.00	1N5309	0.029	2.25
3.30	1N5310	0.024	3.35
3.60	1N5311	0.020	2.50
3.90	1N5312	0.017	2.60
4.30	1N5313	0.014	2.75
4.70	1N5314	0.012	2.90
0.5 $\pm$ 0.3	MCL1300	0.500	1.00
1.0 $\pm$ 0.6	MCL1301	0.200	1.50
2.0 $\pm$ 0.6	MCL1302	0.100	2.00
3.0 $\pm$ 0.6	MCL1303	0.050	2.00
4.0 $\pm$ 0.6	MCL1304	0.025	2.50

Standard devices cover the range from 220 microamperes to 4.7 milliamperes; however, higher and lower currents are available on a custom basis. Devices can be operated in series to produce an extension of the dynamic voltage range or in parallel to extend the current range. In the latter case, the resultant pinch-off current is the summation of the individual currents.

In precision circuitry applications which must operate over a significant temperature range, the temperature coefficient of each device must be thoroughly evaluated by the design engineer. For variations in current, consult the Motorola Designer's Data Sheet, 1N5283 Series. Current regulation may be improved by 1) maintaining a low anode-to-cathode voltage, thus reducing the power dissipation and 2) reducing the junction-to-lead thermal resistance by maintaining short lead lengths, especially the cathode lead.

# FORWARD REFERENCE DIODES

Constant voltage reference diodes designed for stable forward reference voltage sources, transistor amplifier biasing and similar applications.



ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Forward Reference Voltage		Test Current $I_F \text{ (mA)}$	Device Type	Leakage Current $I_R @ V_R$ $\mu\text{A Volts}$		Case
Min	Max					
0.63	0.71	10.0	MZ2360	10	5.0	59
1.24	1.38	10.0	MZ2361	10	5.0	Surmetic 51
1.90	2.10	10.0	MZ2362	10	5.0	Surmetic 51
0.58	0.70	1.0	.4M.64FR10	0.1	4.0	Glass
1.29	1.43	10	.4M1.36FR5			
1.33	1.39	10	.4M1.36FR2			
1.94	2.14	10	.4M2.04FR5			
2.00	2.08	10	.4M2.04FR2			
0.58	0.70	1.0	1N816			



MOLDED ASSEMBLIES



CASE 41



CASE 53



CASE 57

V <sub>Z</sub> Volts	I <sub>ZT</sub> mA	Operating Range -55 to +25 °C +25 to +100 °C		Device Type	Temp. Coeff. For Ref. %/°C	Case
		ΔV <sub>Z</sub> Volts	ΔV <sub>Z</sub> Volts			
12.4	10	0.050 0.020	0.047 0.019	1N4057 1N4057A	0.005 0.002	41-8
14.6		0.058 0.023	0.055 0.022	1N4058 1N4058A	0.005 0.002	
16.8		0.067 0.027	0.063 0.025	1N4059 1N4059A	0.005 0.002	
18.5		0.074 0.030	0.069 0.028	1N4060 1N4060A	0.005 0.002	
21.0		0.084 0.034	0.079 0.032	1N4061 1N4061A	0.005 0.002	
23.0		0.092 0.037	0.086 0.035	1N4062 1N4062A	0.005 0.002	
27.0		0.108 0.043	0.101 0.041	1N4063 1N4063A	0.005 0.002	
30.0		0.120 0.048	0.113 0.045	1N4064 1N4064A	0.005 0.002	
33.0	↓	0.132 0.053	0.124 0.050	1N4065 1N4065A	0.005 0.002	
37.0	7.5	0.148 0.059	0.139 0.056	1N4066 1N4066A	0.005 0.002	
43.0		0.172 0.069	0.161 0.065	1N4067 1N4067A	0.005 0.002	
47.0		0.188 0.075	0.176 0.071	1N4068 1N4068A	0.005 0.002	↓
51.0		0.204 0.082	0.191 0.077	1N4069 1N4069A	0.005 0.002	41-9
56.0		0.224 0.090	0.210 0.084	1N4070 1N4070A	0.005 0.002	
62.0	↓	0.248 0.099	0.232 0.093	1N4071 1N4071A	0.005 0.002	
68.0	5.0	0.272 0.109	0.255 0.102	1N4072 1N4072A	0.005 0.002	
75.0		0.300 0.120	0.281 0.113	1N4073 1N4073A	0.005 0.002	
82.0		0.328 0.131	0.307 0.123	1N4074 1N4074A	0.005 0.002	
87.0		0.348 0.139	0.326 0.131	1N4075 1N4075A	0.005 0.002	
91.0		0.364 0.146	0.341 0.137	1N4076 1N4076A	0.005 0.002	
100	↓	0.400 0.160	0.375 0.150	1N4077 1N4077A	0.005 0.002	↓

V <sub>Z</sub> Volts	I <sub>ZT</sub> mA	Operating Range -55 to +25 °C +25 to +100 °C		Device Type	Temp. Coeff. For Ref. %/°C	Case
		ΔV <sub>Z</sub> Volts	ΔV <sub>Z</sub> Volts			
105	2.5	0.420 0.168	0.394 0.158	1N4078 1N4078A	0.005 0.002	
110		0.440 0.176	0.413 0.165	1N4079 1N4079A	0.005 0.002	
120		0.480 0.192	0.450 0.180	1N4080 1N4080A	0.005 0.002	↓
130		0.520 0.208	0.488 0.195	1N4081 1N4081A	0.005 0.002	41-10
140		0.560 0.224	0.525 0.210	1N4082 1N4082A	0.005 0.002	
150		0.600 0.240	0.563 0.225	1N4083 1N4083A	0.005 0.002	
175		0.700 0.280	0.656 0.263	1N4084 1N4084A	0.005 0.002	
200	↓	0.800 0.320	0.750 0.300	1N4085 1N4085A	0.005 0.002	↓

V <sub>Z</sub> Volts	I <sub>ZT</sub> mA	Temperature Range -55, +25, +100 °C		Device Type	Temp. Coeff. For Ref. %/°C	Case
		ΔV <sub>Z</sub> Volts	ΔV <sub>Z</sub> Volts			
6.2	7.5		0.050	1N429(1)	0.01	53
6.2	7.5		0.050	1N1735	0.01	41-6
8.4	10		0.014	1N1530	0.002	57
8.4	10		0.007	1N1530A(1)	0.001	57
12.4	7.5		0.100	1N1736	0.01	41-3
12.4	↓		0.050	1N1736A	0.005	41-3
18.6			0.150	1N1737	0.01	41-5
18.6			0.075	1N1737A	0.005	
24.8			0.200	1N1738	0.01	
24.8			0.100	1N1738A	0.005	
31.0			0.250	1N1739	0.01	41-4
31.0			0.125	1N1739A	0.005	
37.2			0.300	1N1740	0.01	
37.2			0.150	1N1740A	0.005	
43.4			0.350	1N1741	0.01	
43.4			0.175	1N1741A	0.005	
49.6			0.400	1N1742	0.01	
49.6	↓		0.200	1N1742A(1)	0.005	↓

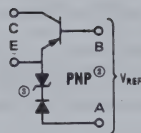
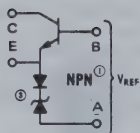
(1) Available as JAN devices.



# REFERENCE AMPLIFIERS



CASE  
212-01



- 1 Add Suffix N to type number for NPN devices.
- 2 Add Suffix P to type number for PNP devices.
- 3 MCA1911 Series uses only zener diode and transistor.

... designed for use in regulated power supplies as a combination voltage reference element and error voltage amplifier, providing temperature compensation for excellent reference voltage stability. Available with either PNP or NPN transistors for versatility of circuit design. Operation over three different temperature ranges: 0 to 75°C, -55 to 100°C, -55 to 150°C.

Note: Basic type numbers are listed in the table; add suffix "P" or "N" to denote specific polarity.

## ELECTRICAL CHARACTERISTICS ( $I_{ZT} = 5.0 \text{ mA}$ , $V_{CEO} = 30 \text{ V}$ )

$V_{REF}$ Volts	Tolerance $\pm\%$	Test Temperature °C	$\Delta V_{REF}$ Volts	Device Type
6.8	10	0, +25, +75	0.051 0.025 0.010 0.005	MCA1911 MCA1912 MCA1913 MCA1914
	5.0	-55, 0, +25, +75, +100	0.105 0.052 0.020 0.010	MCA1921 MCA1922 MCA1923 MCA1924
		-55, 0, +25, +75, +100, +150	0.139 0.069 0.026 0.013	MCA1931 MCA1932 MCA1933 MCA1934
8.6	10	0, +25, +75	0.060 0.030 0.012 0.006	MCA2011 MCA2012 MCA2013 MCA2014
	5.0	-55, 0, +25, +75, +100	0.124 0.062 0.024 0.012	MCA2021 MCA2022 MCA2023 MCA2024
		-55, 0, +25, +75, +100, +150	0.164 0.082 0.032 0.016	MCA2031 MCA2032 MCA2033 MCA2034

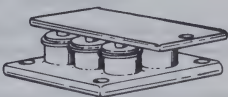
$V_{REF}$ Volts	Tolerance $\pm\%$	Test Temperature °C	$\Delta V_{REF}$ Volts	Device Type
9.5	10	0, +25, +75	0.071 0.035 0.014 0.007	MCA2111 MCA2112 MCA2113 MCA2114
	5.0	-55, 0, +25, +75, +100	0.147 0.073 0.028 0.014	MCA2121 MCA2122 MCA2123 MCA2124
		-55, 0, +25, +75, +100, +150	0.194 0.097 0.038 0.019	MCA2131 MCA2132 MCA2133 MCA2134
11	10	0, +25, +75	0.082 0.041 0.016 0.008	MCA2211 MCA2212 MCA2213 MCA2214
	5.0	-55, 0, +25, +75, +100	0.170 0.085 0.034 0.017	MCA2221 MCA2222 MCA2223 MCA2224
		-55, 0, +25, +75, +100, +150	0.225 0.112 0.044 0.022	MCA2231 MCA2232 MCA2233 MCA2234



SILICON POWER TRANSIENT SUPPRESSORS

Power Zener diodes designed for applications requiring protection of voltage sensitive electronic devices in danger of destruction by high energy voltage transients. Individual cells are matched to insure current sharing under high current pulse conditions.

- Transient Power Dissipation: 40 kW  
Pulse Width: 0.1 ms
- DC Power Dissipation: 350 Watts @  $T_C = 25^{\circ}\text{C}$   
(Derate 2.33 W/ $^{\circ}\text{C}$  above  $25^{\circ}\text{C}$ )
- Operating Junction and Storage Temperature  
Range:  $-65^{\circ}\text{C}$  to  $+175^{\circ}\text{C}$
- Polarity: Anode-to-Case is Standard  
Cathode-to-Case Available Upon Request



Case 119

ELECTRICAL CHARACTERISTICS ( $T_A = 25^{\circ}\text{C}$ ) ( $V_F = 1.5\text{ V max @ }10\text{ A for all types}$ )

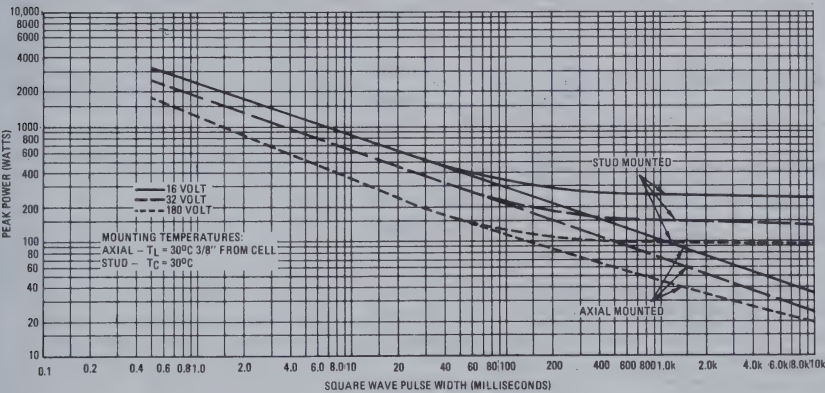
Device Type	Nominal Operating Voltage (Note 1)		Maximum Device Clamping Factor CF = $V_Z @ I_Z(\text{pulse})$ / $V_Z @ I_ZT$	Minimum Zener Voltage		Maximum Zener Voltage Pulse Width = 1.0 ms		Maximum Reverse Current $I_R(\text{max}) @ V_R = V_{OP}(\text{PK})$ $\mu\text{A dc}$	Typical Capacitance C (typ) $@ V_R = V_{OP}(\text{PK})$ $\mu\text{F}$
	$V_{OP}(\text{PK})$ Vdc	$V_{OP}(\text{RMS})$ V rms		$V_Z(\text{min})$ Vdc	@ $I_{ZT}$ Adc	$V_Z(\text{max})$ Vdc	@ $I_{ZT}$ Adc		
MPZ5-16A	14	10	1.25	16	0.4	24	200	50	0.025
-16B	14	10	1.25	16	0.4	20	200	50	0.025
-32A	28	20	1.25	32	0.2	50	100	50	0.011
-32B	28	20	1.25	32	0.2	45	100	50	0.011
-32C	28	20	1.25	32	0.2	40	100	50	0.011
-180A	165	117	1.14	180	0.03	250	20	50	0.0012
-180B	165	117	1.14	180	0.03	225	20	50	0.0012
-180C	165	117	1.14	180	0.03	205	20	50	0.0012

Although the MPZ Series is only offered in an array of six basic cells, special configurations are available with various power and/or voltage ratings (e.g., 1000 W dc and 200 V dc). In order to choose the correct suppressor, the determination must first be made of the energy magnitude, pulse width, and duty cycle of the transient involved. The following graph is presented to aid the design engineer in selecting the proper case outline and/or combination of basic cells suitable for his specific high-power surge appli-

cations. The data represents the surge capabilities of the basic cell (Case 60) both in an axial lead configuration and when mounted on a 7/16" stud base. All data shown reflects the device mounted to an infinite heat sink.

Application Note, AN-461, Transient Suppression with a Power Zener Diode, is available upon request. For more information, contact your nearest Motorola Sales Office or franchised distributor.

BASIC CELL MAXIMUM  
NON-REPETITIVE SURGE POWER



DUAL DIODES



Case 29-01  
TO-92

Dual diodes designed for use in low cost biasing, steering and voltage doubler applications including series, common cathode and common anode dual diodes.

Device Type	$V_{(BR)} @ I_{(BR)}$		$I_R @ V_R$		$V_F @ I_F$		$CV_R = 0$ pF Max	$t_{rr}$ ns Max	Description
	Volts Min	$\mu\text{A}$	$\mu\text{A}$ Max	Volts	Volts Min/Max	mA			
MSD6100	100	100	0.1	50	0.67/0.82	10	1.5	4.0	Switching
MSD6101	50	100	0.1	40	0.67/0.82	10	2.0	10	Discriminator
MSD6102	70	100	0.1	50	0.67/1.0	10	3.0	100	Common Cathode
MSD6150	70	100	0.1	50	-1.0	10	8.0	100	Common Anode
MSD7000	100	100	0.2	50	0.67/0.82	10	1.5	15	Series

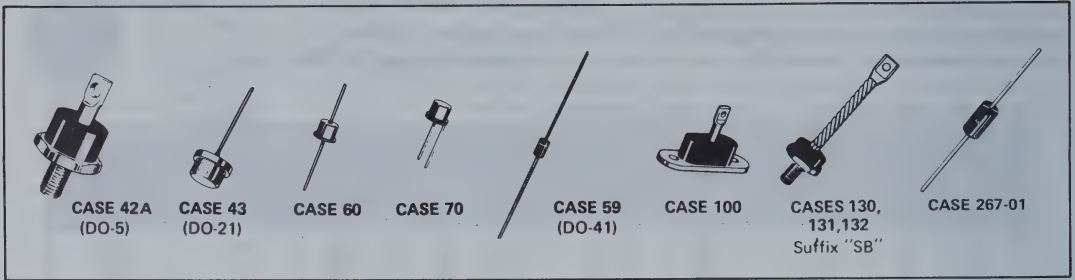


# SILICON RECTIFIERS

## A DIGEST OF THE BROADEST LINE OF QUALITY RECTIFIERS AVAILABLE

Reverse polarity available on all types except as noted

Reversed polarity units can be obtained by adding suffix "R" to standard type number, e.g., 1N3879R.



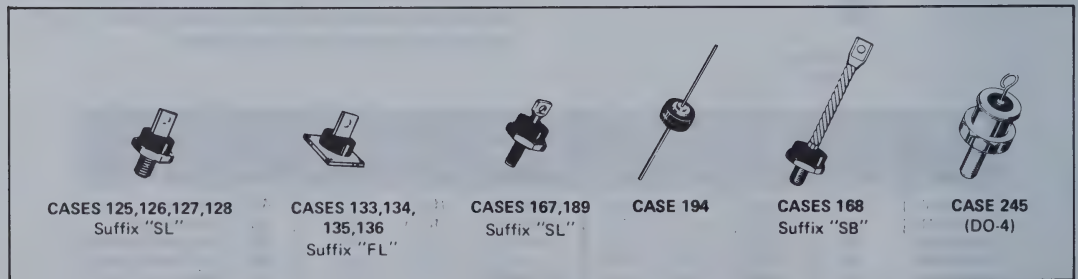
IO, AVERAGE  
RECTIFIED  
FORWARD  
CURRENT

1.0 A		3.0 A			6.0 A	12 A	15 A	20 A	25 A	30 A	35 A	50 A		100 A		200 A	300 A	450 A
Case 59	Case 60	Case 70	Case 267	Case 194	Case 245	Case 42A	Case 42A	Case 43	Case 43	Case 42A	Case 100	Case 43-04	(2)	(2)	(2)	(2)	(2)	
													Case 167	Case 189	Case 126	Case 127	Case 128	
													Case 168		Case 130	Case 131	Case 132	
															Case 133	Case 134	Case 135	

V<sub>RM</sub>(REP)  
MAX PEAK  
REPETITIVE  
REVERSE  
VOLTAGE

100 V	200 V	400 V	600 V	800 V	1000 V
1N4002 1N4720 1N4998 MR501 MR751	1N4003 1N4721 1N4999 MR502 MR752	1N4004 1N4722 1N5000 MR504 MR754	1N4005 1N4723 1N5001 MR506 MR756	1N4006 1N4724 1N5002 MR508	1N4007 1N4725 1N5003 MR510
MR1121 1N1200 1N1200A	MR1122 1N1202 1N1202A	MR1124 1N1204 1N1204A	MR1126 1N1206 1N1206A	MR1128 1N3988	MR1130 1N3990
1N3209 1N245B	1N3210 1N250B	1N3212 1N1196	1N3214 1N1198		
1N3492 (MR323)	1N3493 (MR324)	1N3495 (MR326)	MR328	MR330	MR331
1N3660 1N1184 MR1201FL	1N3661 1N1186 MR1203FL	1N3663 1N1188 MR1207FL	1N1190 MR1209FL		
MR5010 MR1211 MR1811 MR1221 MR1231 MR1241	MR5020 MR1213 MR1813 MR1223 MR1233 MR1243	MR5040 MR1217 MR1817 MR1227 MR1237 MR1247	MR1219 MR1819 MR1229 MR1239 MR1249		

- (1) Not available in reverse polarity.  
(2) Add proper two letter suffix to type number to indicate desired package style, e.g., MR1243FL.

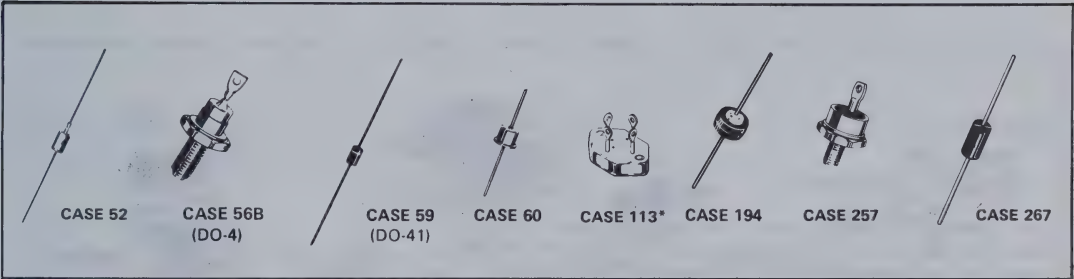




SILICON RECTIFIERS (continued)

FAST RECOVERY POWER RECTIFIERS

This digest represents the latest rectifier products that are recommended for new designs. It does not list all devices available from Motorola. For a more complete listing refer to the Products/Price Listing in this book.

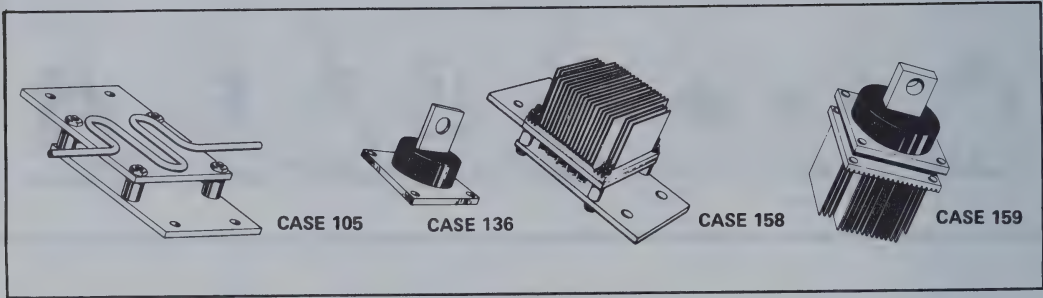


I <sub>O</sub> , AVERAGE RECTIFIED FORWARD CURRENT		PLASTIC						METAL															
		Axial Lead				Axial Lead				Stud Mounted													
		1.0 A		3.0 A		5.0 A		1.0 A		3.0 A		6.0 A		12 A		20 A		30 A		40 A		50 A	
		Case 59-01 DO-41		Case 267-01		194		Case 52 DO-13		Case 60		Case 56B-01 DO-4		Case 257 DO-5									
V <sub>RRM</sub>  MAXIMUM PEAK  REPETITIVE REVERSE  VOLTAGE	50V	1N4933	MR810	MR850	MR820	MR1337-1	MR830	MR840	1N3879	1N3889	1N3899	1N3909	MR860	MR870									
	100V	1N4934	MR811	MR851	MR821	MR1337-2	MR831	MR841	1N3880	1N3890	1N3900	1N3910	MR861	MR871									
	200V	1N4935	MR812	MR852	MR822	MR1337-3	MR832	MR842	1N3881	1N3891	1N3901	1N3911	MR862	MR872									
	300V	MR2271	MR813	—	—	MR1337-4	—	—	1N3882	1N3892	1N3902	1N3912	—	—									
	400V	1N4936	MR814	MR854	MR824	MR1337-5	MR834	MR844	1N3883	1N3893	1N3903	1N3913	MR864	MR874									
	600V	1N4937	MR816	MR856	MR826	MR1337-7	MR836	MR846	MR1366	MR1376	MR1386	MR1396	MR866	MR876									
	800V	—	MR817	—	—	—	—	—	—	—	—	—	—	—									
	1000V	—	MR818	—	—	—	—	—	—	—	—	—	—	—									
Fast Recovery	f=250kHz t <sub>rr</sub> =0.2μs	f=50kHz t <sub>rr</sub> =750 ns	f=250kHz t <sub>rr</sub> =0.2μs		f=250kHz t <sub>rr</sub> =200 ns	f=250kHz t <sub>rr</sub> =0.2μs	f=50kHz t <sub>rr</sub> =1.0μs	f=250kHz t <sub>rr</sub> =0.2μs															

\*See Molded Rectifier Bridge Assemblies — Page 5-17 for MDA952FR-Fast Recovery Bridge



SILICON RECTIFIERS (continued)



$I_O$ , AVERAGE  
RECTIFIED FOR-  
WARD CURRENT

		700 A	750 A	1000 A	1100 A
		Case 136	Case 159	Case 105	Case 158
$V_{RM(REP)}$ MAX PEAK REPETITIVE REVERSE VOLTAGE	100 V	MR1261	MR2081HA	MR1291	MR2101HA
	200 V	MR1263	MR2082HA	MR1293	MR2102HA
	400 V	MR1267	MR2084HA	MR1297	MR2104HA
	600 V	MR1269		MR1299	

SILICON HIGH VOLTAGE  
SURMETIC RECTIFIERS

High-voltage, low-current rectifiers designed for applications where high-voltages in subminiature packages are required. These devices feature efficient high-temperature current-handling performance, high surge-current capabilities and surface passivation.



CASE 169

$I_O$ , AVERAGE RECTIFIED  
FORWARD CURRENT

		0.25 A
		Case 169
$V_{RM(REP)}$ MAX PEAK REPETITIVE REVERSE VOLTAGE	1000 V	MR990A
	1500 V	MR991A
	2000 V	MR992A
	2500 V	MR993A
	3000 V	MR994A
	4000 V	MR995A
	5000 V	MR996A



# HOT-CARRIER POWER RECTIFIERS



CASE 245-01    CASE 60    CASE 257

... utilizes the Schottky Barrier principle in a large area metal-to-silicon power diode. State of the art geometry features epitaxial construction with oxide passivation and metal overlay contact. Features are very low  $V_F$  and high-frequency capability.



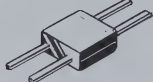

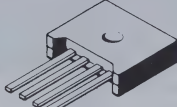







Device Type	$V_{RRM}$ Volts	Forward Current		$I_R$ $T_C = 25^\circ C$ mA	$V_F$ $I_F @ 25 \text{ Amp}$ $T_C = 25^\circ C$ Volts	Case
		$I_O$ $T_C = 85^\circ C$ Amp	$I_{FSM}$ Amp			
1N5823	20	$T_L = 80^\circ C$ 5.0	500	10	$I_F = 5.0 \text{ Amp}$ 0.36	60
1N5824	30	$T_L = 80^\circ C$ 5.0	500	10	$I_F = 5.0 \text{ Amp}$ 0.37	60
1N5825	40	$T_L = 80^\circ C$ 5.0	500	10	$I_F = 5.0 \text{ Amp}$ 0.38	60
1N5826	20	15	500	10	$I_F = 15 \text{ Amp}$ 0.44	245
1N5827	30	15	500	10	$I_F = 15 \text{ Amp}$ 0.47	245
1N5828	40	15	500	10	$I_F = 15 \text{ Amp}$ 0.50	245
1N5829	20	25	800	20	0.44	245
1N5830	30	25	800	20	0.46	245
1N5831	40	25	800	20	0.48	245
1N5832	20	$T_C = 75^\circ C$ 40	800	20	$I_F = 40 \text{ Amp}$ 0.52	257
1N5833	30	$T_C = 75^\circ C$ 40	800	20	$I_F = 40 \text{ Amp}$ 0.55	257
1N5834	40	$T_C = 75^\circ C$ 40	800	20	$I_F = 40 \text{ Amp}$ 0.59	257

Note: Multi-Cell combinations providing increased current capability are available on special request.



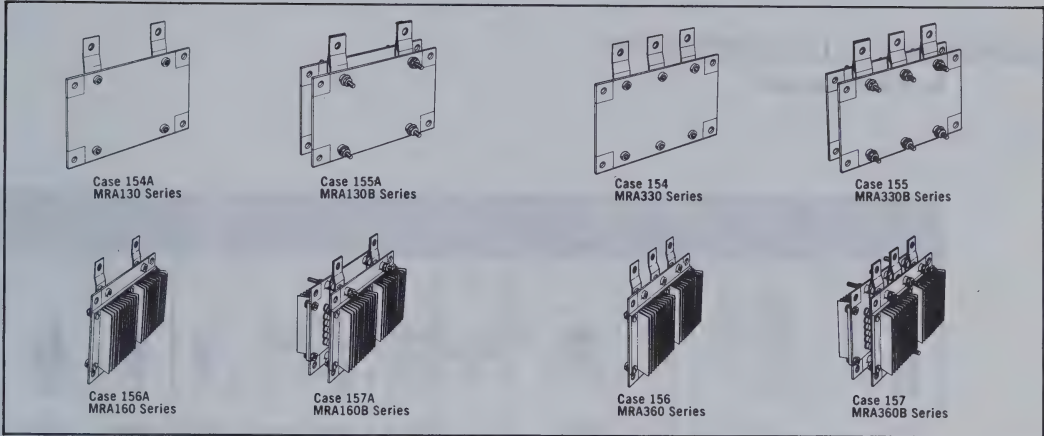
# SILICON POWER RECTIFIER ASSEMBLIES

Low-cost, standard rectifier circuits in small, integral packages providing 1.0 to 27 Amp output current with  $V_{RRM}$  ratings to 1000 Volts. Round leads available on the MDA920 series by adding suffix "A" to device type number (i.e. MDA920A-1).

MIDA RECTIFIER ASSEMBLIES		DEVICE TYPE	$V_{RRM}$ Volts	$I_{FSM}$ Amp	$I_{FRM}$ Amp	$I_{out}$ Amp @ $^{\circ}C$ * $T_A \uparrow T_C$
 Case 108      Case 109	 Single-Phase Full-Wave Bridge	MDA920-1	25	32	5.0	1.0    75*
		-2 -3 -4 -5 -6 -7	50 100 200 300 400 600	↓	↓	↓    ↓
 Case 216-01	 Single-Phase Full-Wave Bridge	MDA922-1	25	60	10	2.0    40*
		-2 -3 -4 -5 -6 -7 -8 -9	50 100 200 300 400 600 800 1000	↓	↓	↓    ↓
 Case 117	 Single-Phase Full-Wave Bridge	MDA970-1	50	150	—	4.0    25*
		-2 -3	100 200	↓	—	↓    ↓
 Case 179-01	 Single-Phase Full-Wave Bridge	MDA970-1	50	150	—	8.0    55†
		-2 -3	100 200	↓	—	↓    ↓
 Case 179-02	 Single-Phase Full-Wave Bridge	MDA980-1	50	300	—	12    55†
		-2 -3 -4 -5 -6	100 200 300 400 600	↓	—	↓    ↓
 Case 179-02	 Single-Phase Full-Wave Bridge	MDA990-1	50	300	—	27    55†
		-2 -3 -4 -5 -6	100 200 300 400 600	↓	—	↓    ↓



# RECTIFIER ASSEMBLIES



## HIGH CURRENT RECTIFIER CIRCUITS

Motorola Multi-Cell II power rectifier diode circuits are air-cooled, integral-heat-sink rectifier assemblies engineered for optimum diode/heat-sink utilization.

Device Type	V <sub>RRM</sub> Volts	DC Output Current Amperes	Configuration
MRA130 MRA131 MRA132 MRA133 MRA134	50 100 200 300 400	300 @ 1500 LFM 75 Free Convection	Single-Phase Half-Wave Bridge 
MRA160 MRA161 MRA162 MRA163 MRA164	50 100 200 300 400	600 @ 1500 LFM 125 Free Convection	
MRA130B MRA131B MRA132B MRA133B MRA134B	50 100 200 300 400	300 @ 1500 LFM 75 Free Convection	Single-Phase Full-Wave Bridge 
MRA160B MRA161B MRA162B MRA163B MRA164B	50 100 200 300 400	600 @ 1500 LFM 125 Free Convection	

Device Type	V <sub>RRM</sub> Volts	DC Output Current Amperes	Configuration
MRA330 MRA331 MRA332 MRA333 MRA334	50 100 200 300 400	300 @ 1500 LFM 75 Free Convection	Three-Phase Half-Wave Bridge 
MRA360 MRA361 MRA362 MRA363 MRA364	50 100 200 300 400	650 @ 1500 LFM 150 Free Convection	
MRA330B MRA331B MRA332B MRA333B MRA334B	50 100 200 300 400	300 @ 1500 LFM 75 Free Convection	Three-Phase Full-Wave Bridge 
MRA360B MRA361B MRA362B MRA363B MRA364B	50 100 200 300 400	650 @ 1500 LFM 150 Free Convection	

Bridge assembly is designated by a "B" suffix, i.e., MRA330B. Bridges are composed of one common cathode and one common anode assembly.

## MOLDED RECTIFIER BRIDGE ASSEMBLIES

... individual hermetically-sealed rectifiers interconnected and encapsulated in molded assemblies for use as single-phase and three-phase full-wave bridge configurations, with output current

range from 1.5 to 16 Amp, peak reverse voltage from 50 to 600 Volts. Series MDA952, MDA962 and MDA1505 for printed circuit insertion without solder lugs (Specify "A" Suffix).

V <sub>RRM</sub> Volts	Single-Phase Full-Wave Bridge 						Three-Phase Full-Wave Bridge 	
	Case 110	Case 111	Case 112	Case 112	Case 113	Case 115	Case 114	
	1.5 Amp			4.0 Amp	6.0 Amp	10 Amp	8.0 Amp	
50	MDA942-1	MDA942A-1	MDA1491-1	MDA1591-1	*MDA952-1	MDA962-1	MDA1505-1	
100	-2	-2	-2	-2	-2	-2	-2	
200	-3	-3	-3	-3	-3	-3	-3	
300	-4	-4	-4	-4	-4	-4	-4	
400	-5	-5	-5	-5	-5	-5	-5	
600	-6	-6	-6	-6	-6	-6	-6	












\* Fast Recovery Bridge available ( $t_{rr} = 200$  ns Max).

To order, specify MDA952FR-1 thru MDA952FR-5.














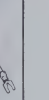
# THYRISTOR DEVICES

## SILICON CONTROLLED RECTIFIERS In Metal Packages

		ON-STATE (RMS) CURRENT													
		0.5 AMP		1.5 AMP		7.0 AMP		8.0 AMP							
															
		Case 22 TO-18 Style 6	Case 31 TO-5 Style 2	Case 79 TO-39 Style 3		Case 85 Style 1	Case 85L Style 1	Case 86 Style 1	Case 86L Style 1	Case 87L Style 1	Case 88L Style 1	Case 86 Style 1	Case 86 Style 1		
BLOCKING VOLTAGE (DC OR PEAK) VOLTS	15 V	MCR201	—	—	—	—	—	—	—	—	—	—	—		
	25 V	—	—	2N2322	2N4212	—	MCR320-1	2N4151	2N4159	2N4167	2N4175	2N4183	2N4191	MCR2315-1	MCR2615-1
	30 V	MCR202	—	—	—	—	—	—	—	—	—	—	—	—	
	50 V	—	2N1595	2N2323	2N4213	MCR32-05	MCR320-2	2N4152	2N4160	2N4168	2N4176	2N4184	2N4192	MCR2315-2	MCR2615-2
	60 V	MCR203	—	—	—	—	—	—	—	—	—	—	—	—	
	100 V	MCR204	2N1596	2N2324	2N4214	—	MCR320-3	2N4153	2N4161	2N4169	2N4177	2N4185	2N4193	MCR2315-3	MCR2615-3
	150 V	MCR205	—	2N2325	2N4215	—	—	—	—	—	—	—	—	—	
	200 V	MCR206	2N1597	2N2326	2N4216	MCR32-20	MCR320-4	2N4154	2N4162	2N4170	2N4178	2N4186	2N4194	MCR2315-4	MCR2615-4
	250 V	—	—	2N2327	2N4217	—	—	—	—	—	—	—	—	—	
	300 V	—	2N1598	2N2328	2N4218	MCR32-30	MCR320-5	2N4155	2N4163	2N4171	2N4179	2N4187	2N4195	MCR2315-5	MCR2615-5
	400 V	—	2N1599	2N2329	2N4219	MCR32-40	MCR320-6	2N4156	2N4164	2N4172	2N4180	2N4188	2N4196	MCR2315-6	MCR2615-6
ELECTRICAL CHARACTERISTICS	500 V	—	—	—	—	MCR32-50	MCR320-7	2N4157	2N4165	2N4173	2N4181	2N4189	2N4197	—	—
	600 V	—	—	—	—	MCR32-60	MCR320-8	2N4158	2N4166	2N4174	2N4182	2N4190	2N4198	—	—
	800 V	—	—	—	—	—	—	—	—	—	—	—	—	—	
	$I_T(AV)$ (Amp) @ $\alpha = 180^\circ$ @ $T_C$	0.5 @ 38°C	1.0 @ 80°C	1.0 @ 85°C	1.0 @ 80°C	—	—	5.0 @ 83°C	5.0 @ 83°C	5.0 @ 83°C	5.0 @ 83°C	5.0 @ 83°C	5.0 @ 83°C	5.0 @ 75°C	5.0 @ 75°C
$I_{TSM}$ (Amp)	6.0	15	15	15	80	80	100	100	100	100	100	100	80	80	
$I_{2t}$ (A <sup>2</sup> s)	0.15	0.5	0.5	0.5	0.15	0.15	40	40	40	40	40	40	40	40	
$I_{GT}$ @ 25°C (mA)	0.2	10	0.2	0.1	20	20	30	30	30	30	30	30	40	40	
$V_{GT}$ @ 25°C (V)	0.8	3.0	0.8	0.8	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
$I_H$ @ 25°C (mA)	5.0	5.0 Typ	2.0	3.0	20	20	30	30	30	30	30	30	50	50	
$t_{gt}$ Typ ( $\mu$ s)	—	0.8	—	—	—	—	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
$dv/dt$ Typ (V/ $\mu$ s)	—	—	—	—	—	—	50	50	50	50	50	50	50	50	



THYRISTOR DEVICES (continued)







16 AMP		20 AMP				25 AMP			35 AMP					
														
Case 263-01 Style 1		Case 174 TO-203 Style 1	Case 175 Style 1	Case 235 Style 1	Case 61 (1) TO-41 Style 1	Case 64 Style 1	Case TO-203 Style 1	Case 174 TO-203 Style 1	Case 175 Style 1	Case 235 Style 1	Case 289-01 Style 1	Case 290-01 Style 1		
2N1842 2N1842A	MCR3818-1 (4)	MCR3918-1 (4)	—	MCR649-1	2N2573	MCR1907-1	2N681	MCR3835-1	MCR3935-1	—	—	—	15 V	BLOCKING VOLTAGE (DC OR PEAK) VOLTS
—	—	—	—	—	—	—	—	—	—	—	—	—	25 V	
—	—	—	—	—	—	—	—	—	—	—	—	—	30 V	
2N1843 2N1843A	2N5164 (4)	2N5168 (4)	—	MCR649-2	2N2574	MCR1907-2	2N682	MCR3835-2	MCR3935-2	—	MCR35-05	MCR36-05	50 V	
—	—	—	—	—	—	—	—	—	—	—	—	—	60 V	
2N1844 2N1844A	MCR3818-3 (4)	MCR3918-3 (4)	2N6167	MCR649-3	2N2575	MCR1907-3	2N683	2N3870 MCR3835-3	2N3896 MCR3935-3	2N6171	MCR35-10	MCR36-10	100 V	
2N1845 2N1845A	—	—	—	—	—	—	2N684	—	—	—	—	—	150 V	
2N1846 2N1846A	2N5165 (4)	2N5169 (4)	2N6168	MCR649-4	2N2576	MCR1907-4	2N685	2N3871 MCR3835-4	2N3897 MCR3935-4	2N6172	MCR35-20	MCR36-20	200 V	
2N1847 2N1847A	—	—	—	—	—	—	2N686	—	—	—	—	—	250 V	
2N1848 2N1848A	MCR3818-5 (4)	MCR3918-5 (4)	—	MCR649-5	2N2577	MCR1907-5	2N687	MCR3835-5	MCR3935-5	—	—	—	300 V	
2N1849 2N1849A	2N5166 (4)	2N5170 (4)	2N6169	MCR649-6	2N2578	MCR1907-6	2N688	2N3872 MCR3835-6	2N3898 MCR3935-6	2N6173	MCR35-40	MCR36-40	400 V	ELECTRICAL CHARACTERISTICS
2N1850 2N1850A	MCR3818-7 (4)	MCR3918-7 (4)	—	MCR649-7	2N2579	—	2N689	MCR3835-7	MCR3935-7	—	—	—	500 V	
—	2N5167 (4)	2N5171 (4)	2N6170	—	—	—	2N690	2N3873 MCR3835-8	2N3899 MCR3935-8	2N6174	MCR35-60	MCR36-60	600 V	
—	—	—	—	—	—	—	—	—	—	—	MCR35-80	MCR36-80	800 V	
10 @ 35°C	13 @ 67°C	13 @ 67°C	13 @ 67°C	13 @ 75°C	16 @ 85°C	16 @ 65°C	16 @ 65°C	22 @ 65°C	22 @ 65°C	22 @ 65°C	—	—	$I_T(AV)$ (Amp) @ $\alpha = 180^\circ$ @ $T_C$	
125	240	240	240	260	260	150	150	350	350	350	325	325	$I_{TSM}$ (Amp)	
60	235	235	235	275	275	75	75	435	435	435	435	435	$I_{gt}$ (A $^2$ s)	
80	40	40	40	80	40	30	25	40	40	40	40	40	$I_{GT}$ @ 25°C (mA)	
2.0	1.5	1.5	1.5	3.5	3.5	1.5	3.0	1.6	1.6	1.6	1.6	1.6	$V_{GT}$ @ 25°C (V)	
20 Typ	50	50	50	20 Typ	20 Typ	12 Typ	20 Typ	50	50	50	50	50	$I_H$ @ 25°C (mA)	
1.0	1.0	1.0	1.0	—	—	0.5	—	1.5 Max	1.5 Max	1.5 Max	—	—	$t_{gt}$ Typ ( $\mu$ s)	
30	50	50	50	—	30	30 Min	30	50	50	50	50	50	$dv/dt$ Typ (V/ $\mu$ s)	

(1) Available without lugs — Case 54, TO-3 (Pin) Package  
 (4) Standard polarity is Anode-to-Case, reverse-polarity (Cathode-to-Case) may be signified by an "R" suffix.



## SILICON CONTROLLED RECTIFIERS

In Plastic Packages

ON-STATE (RMS) CURRENT													
		0.25 AMP		0.8 AMP		4.0 AMP				8.0 AMP		12 AMP	16 AMP
													
		Case 28 Style 8	Case 29 TO-92 Style 10	Plastic Case 77-02 Style 2		Plastic Case 90-04 Style 1		Case 90-04 Style 1		Case 221-02 TO 220 AB Style 1			
V <sub>DRM</sub> BLOCKING VOLTAGE (DC OR PEAK) VOLTS	15 V	MCR051	MCR101	—	—	—	—	—	—	—	—	—	
	25 V	—	—	—	—	—	—	—	MCR3000-1	—	—	—	
	30 V	MCR052	MCR102 2N5060	2N6236	MCR106-1	MCR107-1	MCR406-1	MCR407-1	—	—	—	—	
	50 V	—	—	2N6237	—	—	—	—	2N4441 MCR3000-2	2N6394	2N6400	—	
	60 V	MCR053	MCR103 2N5061	—	MCR106-2	MCR107-2	MCR406-2	MCR407-2	—	—	—	—	
	100 V	MCR054	MCR104 2N5062	2N6238	MCR106-3	MCR107-3	MCR406-3	MCR407-3	MCR3000-3	2N6395	2N6401	—	
	150 V	—	MCR115 2N5063	—	—	—	—	—	—	—	—	—	
	200 V	—	MCR120 2N5064	2N6239	MCR106-4	MCR107-4	MCR406-4	MCR407-4	2N4442 MCR3000-4	2N6396	2N6402	—	
	250 V	—	—	—	—	—	—	—	—	—	—	—	
	300 V	—	—	—	MCR106-5	MCR107-5	—	—	MCR3000-5	—	—	—	
	400 V	—	—	2N6240	MCR106-6	MCR107-6	—	—	2N4443 MCR3000-6	2N6397	2N6403	—	
	500 V	—	—	—	MCR106-7	MCR107-7	—	—	MCR3000-7	—	—	—	
600 V	—	—	2N6241	MCR106-8	—	—	—	2N4444 MCR3000-8	2N6398	2N6404	—		
800 V	—	—	—	—	—	—	—	—	2N6399	2N6405	—		
ELECTRICAL CHARACTERISTICS	I <sub>T</sub> (AV) (Amp) @ α = 180° C @ T <sub>C</sub>	—	0.5 @ 49° C	2.6 @ 90° C	2.6 @ 90° C	2.6 @ 90° C	2.6 @ 90° C	2.6 @ 90° C	5.0 @ 73° C	—	—	—	
	I <sub>TSM</sub> (Amp) I <sup>2</sup> <sub>t</sub> (A <sup>2</sup> s)	6.0 0.15	6.0 0.15	25 2.6	25 2.6	25 2.6	30 3.6	20 1.6	80 25	100 40	160 100	—	
	I <sub>GT</sub> @ 25° C (mA)	0.2	0.2	0.2	0.5	20	0.2	0.5	30	30	30	—	
	V <sub>GT</sub> @ 25° C (V)	0.8	0.8	0.8	1.0	1.5	0.8	1.0	1.5	1.5	1.5	—	
	I <sub>H</sub> @ 25° C (mA)	5.0	5.0	3.0	5.0	20	3.0	5.0	4.0	40	40	—	
	t <sub>gt</sub> Typ (μs)	—	—	1.2	—	—	—	—	1.0	1.0	1.0	—	
	dv/dt Typ (V/μs)	—	—	10	10	10	10	10	50	50	50	—	



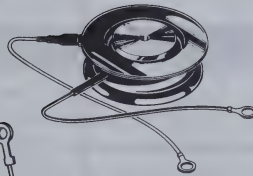
# POWER THYRISTORS

High current thyristors from 110 Amperes (RMS) to 470 Amperes (RMS) are now available from Motorola to more fully encompass the needs of semiconductor users. These Silicon Controlled Rectifiers are designed for high power industrial and consumer applications such as welders, furnaces, motors, and space heaters.

Construction features employ special materials and alloys which are carefully tested and selected to provide the reliability and performance demanded by the most sophisticated industrial application. These features are:

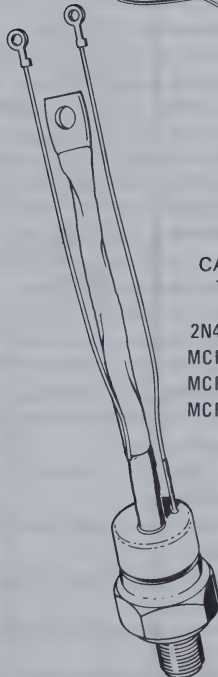
1. Large area single die
2. Hermetically sealed package using high quality ceramic
3. Fatigue-free, pressure-loaded die contact system

CASE 220-01



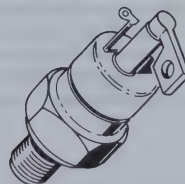
MCR235 Series  
MCR235A Series  
MCR235B Series  
MCR235C Series  
MCR380 Series  
MCR380B Series  
MCR380C Series  
MCR380D Series  
MCR470 Series  
MCR470C Series  
MCR470D Series  
MCR470E Series

CASE 219  
TO-94



2N4361 Series  
MCR154 Series  
MCR155 Series  
MCR158 Series

2N4371 Series  
MCR156 Series  
MCR157 Series  
MCR159 Series



CASE 246  
TO-83












# THYRISTOR DEVICES (continued)

## POWER THYRISTORS (continued)

### HIGH CURRENT SCR's

### FAST SWITCHING SILICON CONTROLLED RECTIFIERS

											
		Case 219 TO-94 Style 1	Case 246* TO-83 Style 1	Case 220-01 Style 1	Case 219 TO-94 Style 1	Case 246* TO-83 Style 1	Case 219 TO-94 Style 1	Case 246* TO-83 Style 1	Case 219 TO-94 Style 1	Case 246* TO-83 Style 1	
AMP RMS		110 A		235 A	380 A	470 A	110 A				
TURN-OFF TIME							10 $\mu$ s	20 $\mu$ s	30 $\mu$ s		
BLOCKING VOLTAGE (VOLTS)	VDRM VRRM	100 V	2N4361 2N4371 *	MCR235-10	MCR380-10	MCR470-10	MCR154-10 MCR156-10 *	MCR155-10 MCR157-10 *	MCR158-10 MCR159-10 *		
		200 V	2N4362 2N4372 *	MCR235-20	MCR380-20	MCR470-20	MCR154-20 MCR156-20 *	MCR155-20 MCR157-20 *	MCR158-20 MCR159-20 *		
		300 V	—	MCR235-30	MCR380-30	MCR470-30	MCR154-30 MCR156-30 *	MCR155-30 MCR157-30 *	MCR158-30 MCR159-30 *		
		400 V	2N4363 2N4373 *	MCR235-40	MCR380-40	MCR470-40	MCR154-40 MCR156-40 *	MCR155-40 MCR157-40 *	MCR158-40 MCR159-40 *		
		500 V	—	MCR235-50	MCR380-50	MCR470-50	MCR154-50 MCR156-50 *	MCR155-50 MCR157-50 *	MCR158-50 MCR159-50 *		
		600 V	2N4364 2N4374 *	MCR235-60	MCR380-60	MCR470-60	MCR154-60 MCR156-60 *	MCR155-60 MCR157-60 *	MCR158-60 MCR159-60 *		
		700 V	—	MCR235-70	MCR380-70	MCR470-70	—	—	MCR158-70 MCR159-70 *		
		800 V	2N4365 2N4375 *	MCR235-80	MCR380-80	MCR470-80	—	—	MCR158-80 MCR159-80 *		
		900 V	—	MCR235-90	MCR380-90	MCR470-90	—	—	MCR158-90 MCR159-90 *		
		1000 V	2N4366 2N4376 *	MCR235-100	MCR380-100	MCR470-100	—	—	MCR158-100 MCR159-100 *		
		1100 V	—	MCR235-110	MCR380-110	MCR470-110	—	—	MCR158-110 MCR159-110 *		
		1200 V	2N4367 2N4377 *	MCR235-120	MCR380-120	MCR470-120	—	—	MCR158-120 MCR159-120 *		
		1300 V	—	MCR230-130	MCR380-130	MCR470-130	—	—	—		
		1400 V	2N4368 2N4378 *	MCR235-140	MCR380-140	MCR470-140	—	—	—		
		1500 V	—	MCR235-150	MCR380-150	MCR470-150	—	—	—		



THYRISTOR DEVICES (continued)

FAST SWITCHING SILICON  
 CONTROLLED RECTIFIERS (continued)











Case 220-01  
 Style 1

235 A			380 A			470 A			AMP RMS	BLOCKING VOLTAGE (VOLTS)
10 $\mu$ s	15 $\mu$ s	20 $\mu$ s	15 $\mu$ s	20 $\mu$ s	30 $\mu$ s	20 $\mu$ s	30 $\mu$ s	40 $\mu$ s	TURN-OFF TIME	
MCR235A-10	MCR235B-10	MCR235C-10	MCR380B-10	MCR380C-10	MCR380D-10	MCR470C-10	MCR470D-10	MCR470E-10	100 V	
MCR235A-20	MCR235B-20	MCR235C-20	MCR380B-20	MCR380C-20	MCR380D-20	MCR470C-20	MCR470D-20	MCR470E-20	200 V	
MCR235A-30	MCR235B-30	MCR235C-30	MCR380B-30	MCR380C-30	MCR380D-30	MCR470C-30	MCR470D-30	MCR470E-30	300 V	
MCR235A-40	MCR235B-40	MCR235C-40	MCR380B-40	MCR380C-40	MCR380D-40	MCR470C-40	MCR470D-40	MCR470E-40	400 V	
MCR235A-50	MCR235B-50	MCR235C-50	MCR380B-50	MCR380C-50	MCR380D-50	MCR470C-50	MCR470D-50	MCR470E-50	500 V	
MCR235A-60	MCR235B-60	MCR235C-60	MCR380B-60	MCR380C-60	MCR380D-60	MCR470C-60	MCR470D-60	MCR470E-60	600 V	
—	MCR235B-70	MCR235C-70	MCR380B-70	MCR380C-70	MCR380D-70	MCR470C-70	MCR470D-70	MCR470E-70	700 V	
—	MCR235B-80	MCR235C-80	MCR380B-80	MCR380C-80	MCR380D-80	MCR470C-80	MCR470D-80	MCR470E-80	800 V	
—	—	MCR235C-90	—	MCR380C-90	MCR380D-90	—	MCR470D-90	MCR470E-90	900 V	
—	—	MCR235C-100	—	MCR380C-100	MCR380D-100	—	MCR470C-100	MCR470E-100	1000 V	
—	—	—	—	—	MCR380D-110	—	—	MCR470E-110	1100 V	
—	—	—	—	—	MCR380D-120	—	—	MCR470E-120	1200 V	
—	—	—	—	—	—	—	—	—	1300 V	
—	—	—	—	—	—	—	—	—	1400 V	
—	—	—	—	—	—	—	—	—	1500 V	



THYRISTOR DEVICES (continued)


TRIACS – SILICON BIDIRECTIONAL THYRISTORS  
In Metal Packages

ON-STATE (RMS) CURRENT															
10 AMP								15 AMP				25 AMP			
															
Case 85 Style 2	Case 86 Style 2	Case 250 Style 2	Case 871 Style 2	Case 174 TO-203 Style 3	Case 175 Style 3	Case 235 Style 2	Case 174 TO-203 Style 3								

BLOCKING VOLTAGE (DC OR PEAK) VOLTS		25 V	MAC1-1	MAC4-1	MAC5-1	—	MAC2-1	—	—	MAC3-1	MAC6-1	—	—	—	MAC35-1	MAC37-1
		50 V	MAC1-2	MAC4-2	MAC5-2	—	MAC2-2	—	—	MAC3-2	MAC6-2	—	—	—	MAC35-2	MAC37-2
		100 V	MAC1-3	MAC4-3	MAC5-3	—	MAC2-3	—	—	MAC3-3	MAC6-3	—	—	—	MAC35-3	MAC37-3
		200 V	MAC1-4	MAC4-4	MAC5-4	2N6139	—	2N6142	2N6148	—	MAC6-4	2N5571	2N5573	2N6145	—	MAC37-4
		300 V	MAC1-5	MAC4-5	MAC5-5	—	—	—	—	—	MAC6-5	—	—	—	—	MAC37-5
		400 V	MAC1-6	MAC4-6	MAC5-6	2N6140	—	2N6143	2N6149	—	MAC6-6	2N5572	2N5574	2N6146	—	MAC37-6
		500 V	MAC1-7	MAC4-7	MAC5-7	—	—	—	—	—	MAC6-7	—	—	—	—	MAC37-7
		600 V	MAC1-8	MAC4-8	MAC5-8	2N6141	—	2N6144	2N6150	—	MAC6-8	MAC40797	MAC40798	2N6147	—	—
		800 V	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ELECTRICAL CHARACTERISTICS	I <sub>GT</sub> @ 25°C (mA)															
	MT2(+), G(+)	40	50	50	50	40	50	50	40	50	50	50	50	75	75	
	MT2(+), G(-)	40	—	—	75	40	75	75	40	—	80	80	80	100	—	
	MT2(-), G(-)	40	50	50	50	40	50	50	40	50	50	50	50	75	75	
	MT2(-), G(+)	40	—	—	75	40	75	75	40	—	80	80	80	100	—	
	V <sub>GT</sub> @ 25°C (V)															
	MT2(+), G(+)	2.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	3.0	3.0	
	MT2(+), G(-)	2.0	—	—	2.5	2.0	2.5	2.5	2.0	—	2.5	2.5	2.5	3.0	—	
	MT2(-), G(-)	2.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.5	2.5	3.0	3.0	
	MT2(-), G(+)	2.0	—	—	2.5	2.0	2.5	2.5	2.0	—	2.5	2.5	2.5	3.0	—	
I <sub>TSM</sub> (Amp)		100	100	100	100	100	100	100	100	100	100	100	100	225	225	



THYRISTOR DEVICES (continued)






25 AMP					30 AMP				40 AMP			
												
Case 175 Style 3	Case 174 TO-203 Style 3	Case 175 Style 3	Case 235 Style 2		Case 289-01 Style 2	Case 290-01 Style 2			Case 237 Style 2	Case 238 Style 2	Case 239 Style 2	
MAC36-1	MAC38-1	—	—	—	—	—	—	—	—	—	—	25 V
MAC36-2	MAC38-2	—	—	—	MAC30-05	MAC30A-05	MAC31-05	MAC31A-05	—	—	—	50 V
MAC36-3	MAC38-3	—	—	—	MAC30-10	MAC30A-10	MAC31-10	MAC31A-10	—	—	—	100 V
—	MAC38-4	2N6157	2N6160	2N6163	MAC30-20	MAC30A-20	MAC31-20	MAC31A-20	2N5441	2N5444	MAC40688	200 V
—	MAC38-5	—	—	—	—	—	—	—	—	—	—	300 V
—	MAC38-6	2N6158	2N6161	2N6164	MAC30-40	MAC30A-40	MAC31-40	MAC31A-40	2N5442	2N5445	MAC40689	400 V
—	MAC38-7	—	—	—	—	—	—	—	—	—	—	500 V
—	—	2N6159	2N6162	2N6165	MAC30-60	MAC30A-60	MAC31-60	MAC31A-60	2N5443	2N5446	MAC40690	600 V
—	—	—	—	—	MAC30-80	MAC30A-80	MAC31-80	MAC31A-80	—	—	—	800 V
75 100 75 100	75 — 75 —	60 70 70 100	60 70 70 100	60 70 70 100	50 — 50 —	50 70 50 70	50 — 50 —	50 70 50 70	70 70 70 100	70 70 70 100	70 70 70 100	BLOCKING VOLTAGE (DC OR PEAK) VOLTS
3.0 3.0 3.0 3.0	3.0 — 3.0 —	2.0 2.1 2.1 2.5	2.0 2.1 2.1 2.5	2.0 2.1 2.1 2.5	2.0 — 2.0 —	2.0 2.5 2.0 2.5	2.0 — 2.0 —	2.0 2.5 2.0 2.5	2.0 2.0 2.0 2.5	2.0 2.0 2.0 2.5	2.0 2.0 2.0 2.5	ELECTRICAL CHARACTERISTICS
225	225	250	250	250	300	300	300	300	300	300	300	IGT @ 25°C (mA) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)
												VGT @ 25°C (V) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)
												ITSM (Amp)



# THYRISTOR DEVICES (continued)

## TRIACS – SILICON BIDIRECTIONAL THYRISTORS






In Plastic Packages

ON-STATE (RMS) CURRENT																
		0.45 AMP			0.65 AMP	0.8 AMP	4.0 AMP			8.0 AMP		10 AMP		12 AMP		
																
		Case 29-02 TO-92 Style 12						Case 77 Style 5			Case 221-02 TO-220 AB Style 2		Case 90 Style 4		Cast 221-02 TO-220 AB Style 2	
BLOCKING VOLTAGE (DC OR PEAK) VOLTS	25 V	—	—	—	2N6068	2N6068A	2N6068B	—	—	MAC11-1	MAC10-1	—	—			
	30 V	MAC92-1 MAC92A-1*	MAC93-1 MAC93A-1*	MAC94-1 MAC94A-1*	—	—	—	—	—	—	—	—	—			
	50 V	—	—	—	2N6069	2N6069A	2N6069B	—	—	MAC11-2	MAC10-2	—	—			
	60 V	MAC92-2 MAC92A-2*	MAC93-2 MAC93A-2*	MAC94-2 MAC94A-2*	—	—	—	—	—	—	—	—	—			
	100 V	MAC92-3 MAC92A-3*	MAC93-3 MAC93A-3*	MAC94-3 MAC94A-3*	2N6070	2N6070A	2N6070B	—	—	MAC11-3	MAC10-3	—	—			
	200 V	MAC92-4 MAC92A-4*	MAC93-4 MAC93A-4*	MAC94-4 MAC94A-4*	2N6071	2N6071A	2N6071B	2N6342	2N6346	2N6154 MAC11-4	2N6151 MAC10-4	2N6342A	2N6346A			
	300 V	MAC92-5 MAC92A-5*	—	—	2N6072	2N6072A	2N6072B	—	—	MAC11-5	MAC10-5	—	—			
	400 V	MAC92-6 MAC92A-6*	—	—	2N6073	2N6073A	2N6073B	2N6343	2N6347	2N6155 MAC11-6	2N6152 MAC10-6	2N6343A	2N6347A			
	500 V	—	—	—	2N6074	2N6074A	2N6074B	—	—	MAC11-7	MAC10-7	—	—			
	600 V	—	—	—	2N6075	2N6075A	2N6075B	2N6344	2N6348	2N6156 MAC11-8	2N6153 MAC10-8	2N6344A	2N6348A			
800 V	—	—	—	—	—	—	2N6345	2N6349	—	—	2N6345A	2N6349A				
ELECTRICAL CHARACTERISTICS	I <sub>GT</sub> @ 25°C (mA)	5.0	5.0	5.0	30	5.0	3.0	50	50	50	50	50	50	50		
	MT2(+), G(+)	15*	12*	10*	—	5.0	3.0	—	75	—	75	—	75	—		
	MT2(+), G(-)	5.0	5.0	5.0	30	5.0	3.0	50	50	50	50	50	50	50		
	MT2(-), G(-)	15*	12*	10*	—	10	5.0	—	75	—	75	—	75	—		
	V <sub>GT</sub> @ 25°C (V)	2.0	2.0	2.0	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
	MT2(+), G(+)	2.0*	2.0*	2.0*	—	2.5	2.5	—	2.5	—	2.5	—	2.5	—		
	MT2(+), G(-)	2.0	2.0	2.0	2.5	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
	MT2(-), G(-)	2.0*	2.0*	2.0*	—	2.5	2.5	—	2.5	—	2.5	—	2.5	—		
	I <sub>TSM</sub> (Amp)	6.0	6.0	6.0	30	30	30	100	100	100	100	120	120	120		

\*Denotes A Version



## SPECIAL-PURPOSE SCR<sub>s</sub>

Light Activated SCRs		Capacitive Discharge Ignition System SCRs	Pulse Modulator SCRs		
ON-STATE (RMS) CURRENT					
0.25 AMP	0.4 AMP	7.0 AMP	100 AMP (Pulse)	300 AMP (Pulse)	1000 AMP (Pulse)
					
Case 29 TO-92 Style 19	Case 82 TO-18 Style 2	Case 79 TO-39 Style 3	Fast Switching Case 63 Style 1		Fast Switching Case 64 TO-48 Style 2

BLOCKING VOLTAGE (DC OR PEAK) VOLTS		15 V	MLS101	MLS201	—	—	—	—	—
		25 V	—	—	—	—	MCR846-1	—	—
		30 V	MLS102	MLS202	—	—	—	—	—
		50 V	—	—	MCR39-05	—	MCR846-2	—	—
		60 V	MLS103	MLS203	—	—	—	—	—
		100 V	MLS104	MLS204	—	—	MCR846-3	—	—
		150 V	—	—	—	—	—	—	—
		200 V	MLS105	MLS205	MCR39-20	—	MCR846-4	—	—
		250 V	—	—	—	—	—	—	—
		300 V	—	—	MCR39-30	2N4199 2N4199JAN	—	MCR1336-5	MCR1718-5
		400 V	—	—	MCR39-40	2N4200 2N4200JAN	—	MCR1336-6	MCR1718-6
		500 V	—	—	MCR39-50	2N4201 2N4201JAN	—	MCR1336-7	MCR1718-7
		600 V	—	—	MCR39-60	2N4202 2N4202JAN (2) (3)	—	MCR1336-8 (2) (3)	MCR1718-8
ELECTRICAL CHARACTERISTICS	I <sub>TSM</sub> (Amp)		5.0	5.0	180	—	—	—	
	I <sup>2</sup> <sub>t</sub> (A <sup>2</sup> s)		—	—	—	—	35	—	250
	I <sub>GT</sub> @ 25°C (mA)		0.1	0.1	15	50	50	40	50
	V <sub>GT</sub> @ 25°C (V)		0.8	0.8	1.25	1.5	1.5	1.25	1.5
	I <sub>H</sub> @ 25°C (mA)		2.0	2.0	—	3.0 Min	25 Typ	50	15 Typ
	t <sub>gt</sub> Typ (μs)		—	—	—	0.4 Max	0.5	0.15	—
	dv/dt Typ (V/μs)		—	—	50 Min	250 Min	50 Min	250 Min	100
H <sub>ET</sub> (mW/cm <sup>2</sup> )		50	20	—					

(2) 700V — 2N4203, 2N4203JAN and MCR1336-9 Available

(3) 800V — 2N4204, 2N4204JAN, and MCR1336-10 Available



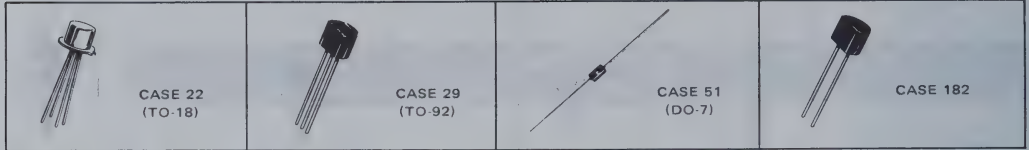
## TRIGGER DEVICES

The ideal SCR or Triac complement is a trigger developed to meet design and cost considerations.

Motorola has the broadest line of signal triggers!

New unilateral switches for SCR triggering, bilateral

switches for Triac control — there are more than 3 dozen signal thyristor devices available that enable the right metal or plastic device to be selected for any thyristor power control application.



### SILICON BIDIRECTIONAL SWITCH — SBS

Device Type	Case No./ Style	V <sub>S</sub> Switching Voltage Vdc		I <sub>S</sub> Switching Current $\mu$ Adc Max	I <sub>H</sub> Holding Current mAdc Max	V <sub>S1</sub> - V <sub>S2</sub>   Switching Voltage Differential Vdc Max	V <sub>F</sub> Forward ON-State Voltage (1) I <sub>F</sub> = 175 mAdc (2) I <sub>F</sub> = 200 mAdc Volts Max
		Min	Max				
MBS4991	29-02/12	6.0	10	500	1.5	0.5	1.7 (1)
MBS4992	29-02/12	7.5	9.0	120	0.5	0.2	1.7 (2)
2N4993	22/9	6.0	10	500	1.5	0.5	1.7 (2)
MBS100	29-02/12	3.0	5.0	400	1.0	0.350	2.0 (2)

### SILICON UNIDIRECTIONAL SWITCH — SUS

Device Type	Case No./ Style	V <sub>S</sub> Switching Voltage Volts		I <sub>S</sub> Switching Current $\mu$ A Max	I <sub>H</sub> Holding Current mA	V <sub>F</sub> Forward Voltage I <sub>F</sub> = 150 mA	I <sub>B</sub> @ 5.0V Forward Blocking Current $\mu$ A	P <sub>D</sub> Power Dissipation mW	V <sub>R</sub> Reverse Voltage Volts Max	V <sub>O</sub> Peak Pulse Voltage Volts Min	I <sub>F</sub> (rep) Peak Recurrent Forward Current T <sub>A</sub> = 100 °C, t <sub>p</sub> = 10 $\mu$ s 1.0% duty cycle Amp
		Min	Max								
MUS4987	29-02/16	6.0	10	500	1.5	1.5	0.1	300	30	3.5	2.0
MUS4988	29-02/16	7.5	9.0	150	0.5	1.5	0.1	300	30	3.5	2.0

### BILATERAL TRIGGER DIACS

Device Type	Case No.	V <sub>S</sub> Switching Voltage (Both Directions)	I <sub>S</sub> Switching Current (Both Directions)	ΔV Switchback Voltage (Both Directions)	I <sub>B</sub> Leakage Current (Both Directions) V = 14 V	I <sub>pulse</sub> Peak Pulse Current @ 30 μs, 120 Hz
		Volts Nom	μA Max	Volts Min	μA Max	Amp Max
1N5758/MPT20	182-01/3	20 ± 4.0	100	5.0	10	2.0
1N5759		24 ± 4.0	100	5.0		
1N5760/MPT28		28 ± 4.0	100	7.0		
1N5761/MPT32		32 ± 4.0	100	7.0		
1N5762		36 ± 4.0	100	7.0		
1N5758A		20 ± 2.0	25	5.0		
1N5759A		24 ± 2.0	25	5.0		
1N5760A		28 ± 2.0	25	7.0		
1N5761A		32 ± 2.0	25	7.0		
1N5762A		36 ± 2.0	25	7.0		



4-LAYER DIODES (PEAK PULSE CURRENT = 10 Amp @ PW = 50  $\mu$ s Max, I<sub>F</sub> = 150 mA Max)

Device Type	Case No.	V <sub>S</sub> Switching Voltage Volts		I <sub>S</sub> Switching Current	I <sub>H</sub> Holding Current T <sub>A</sub> = 25°C mA		I <sub>pulse</sub> Peak Pulse Current @ 50 μs Amp	
		Min	Max	μA Max	Min	(Max)	Max	
1N5158 (M4L3052)	51 ↓	8.0	10	50 ↓ 100 ↓	1.0	20	10 ↓	
1N5159 (M4L3053)		9.0	11		↓ 10 ↓ 0.1 ↓	↓ 50 ↓ 2.0 ↓		
1N5160 (M4L3054)		10	12					
1N5779 (M4L3055)		11	13					
1N5780 (M4L3056)		12	14					
1N5781		13	15					
1N5782		8.0	10					
1N5783		9.0	11					
1N5784		10	12					
1N5785		11	13					
1N5786		12	14					
1N5787		13	15					
1N5788		8.0	10					
1N5789		9.0	11					
1N5790		10	12					
1N5791		11	13					
1N5792	12	14						
1N5793	13	15						



# UNIUNCTION TRANSISTORS

Motorola Unijunction Transistors give you state-of-the-art leadership in technology and performance because

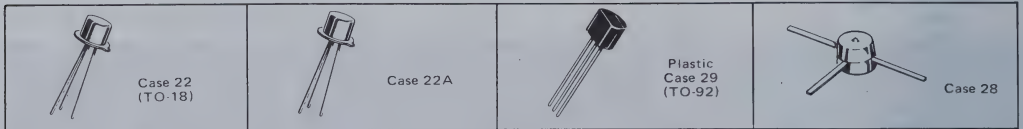
...the Annular process furnishes fast-response, long-time-delay advantage as well as superior reliability and stability in all applications.

...there are over 30 different metal and plastic Motorola UJT's to meet your top performance need in most any design from consumer to military.

...computerized testing ensures uniform results, faster deliveries and user confidence.

...ready availability meets any demand.

...applications assistance is yours for the asking, like AN-294, "Unijunction Transistor Timers and Oscillators," a valuable application note we'll send you.



## UNIUNCTION TRANSISTORS – UJT

Device Type	Case No./ Style	$\eta$ Intrinsic Standoff Ratio		$I_P$ Peak Point Emitter Current $\mu A$ Max	$I_{EB20}$ Emitter Reverse Current $\mu A$ Max	$I_V$ Valley Point Current mA Min	$V_{B2B1}$ Interbase Voltage Volts Max	$P_D$ Power Dissipation mW Max
		(Min)	Max					
MU10	29/9	0.50	0.85	5.0	1.0	1.0	35	300
2N4870		0.56	0.75	5.0	1.0	2.0	35	
2N4871		0.70	0.85	5.0	1.0	4.0	35	
MU4891		0.55	0.82	5.0	0.01	2.0		
MU4892		0.51	0.69	2.0				
MU4893	28/7	0.55	0.82	2.0				200
MU4894		0.74	0.86	1.0				
MU851		0.56	0.75	2.0	0.1	2.0	28	
MU852		0.70	0.85	2.0	0.1	4.0		
MU853		0.70	0.85	0.4	0.05	4.0		
MU20	22A/1	0.56	0.85	2.0	0.2	1.0	35	300
2N2646		0.56	0.75	5.0	12	4.0		300
2N2647		0.68	0.82	2.0	0.2	8.0		300
2N3980		0.68	0.82	2.0	0.01	1.0		360
2N4851		0.56	0.75	2.0	0.1	2.0		300
2N4852		0.70	0.85	2.0	0.1	4.0		300
2N4853		0.70	0.85	0.4	0.05	6.0		300
2N4948		0.55	0.82	2.0	0.01	2.0		360
JAN2N4948 (1)		0.55	0.82	2.0				
2N4949		0.74	0.86	1.0				
JAN2N4949 (1)		0.74	0.86	1.0				
2N5431		0.72	0.80	0.4			35	300
JAN2N5431 (2)		0.72	0.80	0.4			35	300

## COMPLEMENTARY UNIUNCTION TRANSISTORS – CUJT

Device Type	Case No./ Style	$\eta$ Intrinsic Standoff Ratio		$I_P$ Peak Point Emitter Current $\mu A$ Max	$I_{EB20}$ Emitter Reverse Current nA Max	$I_V$ Valley Point Current mA Min	$V_{B2B1}$ Interbase Voltage Volts Max	$P_D$ Power Dissipation mW Max
		Min	Max					
2N6114	22A/1	0.58	0.62	5.0	10	1.0	30	300
2N6115	22A/1	0.58	0.62	15	100	1.0	30	300

## PROGRAMMABLE UNIUNCTION TRANSISTORS – PUT

Device Type	Case No./ Style	$I_P$ Peak Current $R_G = 10\text{ k}\Omega$ $R_G = 1.0\text{ M}\Omega$		$I_{GAO}$ Leakage Current @ 40 V nA Max	$I_V$ Valley Current $R_G = 10\text{ k}\Omega$ $R_G = 1.0\text{ M}\Omega$ $R_G = 200\text{ }\Omega$			$P_D$ mW	$V_O$ Output Voltage Volts Min	$V_F$ Forward Voltage Volts @ $I_F$ mA	$I_T$ DC Anode Current mA Max	$I_T$ (pulse) Peak Anode Current 20 $\mu s$ 1.0% DC Amp Max	$t_r$ Pulse Rate of Rise ns	$T_J$ Operating Junction Temp. Range $^{\circ}C$	
		$\mu A$ Max	$\mu A$ Max		$\mu A$ Min	$\mu A$ Max	(Min)								
2N6027	29/16	5.0	2.0	10	70	50	1.5	375	6.0	1.5	50	200	5.0	80	50 to +100
2N6028		1.0	0.15		25	25	1.0								
MPU6027		5.0	2.0		70	50									
MPU6028		1.0	0.15		25	25	—								
MPU131	29/10	5.0	2.0	5.0	70	50	—								
MPU132	29/10	2.0	0.3	5.0	50	50	—						2.0		
MPU133	29/10	1.0	0.15	5.0	50	25	—								50 to +100
2N6116	22/6	5.0	2.0	5.0	70	50	—	250							
2N6117	22/6	2.0	0.3	5.0	50	50	—	250							
2N6118	22/6	1.0	0.15	5.0	50	25		250							50 to +125

Gate to Cathode Forward Voltage ( $V_{GKF}$ ) = 40 V Max.

(1) Meets the Requirements of MIL S 19500/388

(2) Meets the Requirements of MIL S 19500/425



# FIELD-EFFECT TRANSISTORS

Motorola offers a line of field-effect transistors encompassing the latest technology and covering the entire gamut of potential applications. Included is a wide variety of junction FETs and MOSFETs, with N- or P-channel polarity. These FETs include devices optimized for operation from dc to UHF in switching and amplifying applications.

Moreover, an exclusive silicon-nitride passivation process now being employed on all Motorola MOSFETs has greatly improved MOSFET threshold stability with aging and temperature change. This process also

reduces susceptibility to damage from static-charge buildup during handling because of its increased voltage breakdown capability. All Motorola single-gate MOSFETs have transient gate breakdown voltages of greater than  $\pm 150$  Vdc peak (typical).

The selection tables in this guide are designed to permit a rapid selection of specific field-effect transistors for a variety of applications.

Six tables cover the major application categories:

<b>RF Amplifiers and Mixers</b> <b>Table 1</b> ... high performance single and dual gate devices specifically designed for RF applications	<b>General-Purpose Switches</b> <b>Table 4</b> ... these devices are suitable for medium-speed switching applications.
<b>Choppers</b> <b>Table 2</b> ... FETs have no offset voltage, and as a result, they are particularly well suited for chopper applications.	<b>Matched Pairs</b> <b>Table 5</b> ... pairs of carefully matched devices for critical applications such as differential-amplifier service.
<b>General-Purpose Amplifiers</b> <b>Table 3</b> ... N- and P-channel field-effect transistors designed for small-signal amplification at low and moderate frequencies (to 30 MHz).	<b>Micro-T Field-Effect Transistor</b> <b>Table 6</b> ... where high density packaging is required.

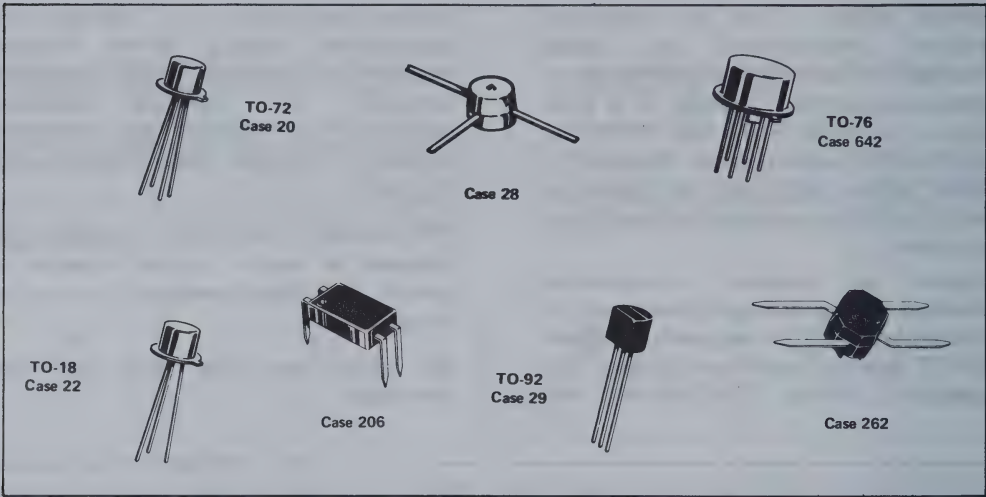
The information in the tables is necessarily brief to simplify selection. Complete specifications for these devices are given in Volumes 1 and 2 of the Motorola Semiconductor Data Library.

Ask for Motorola's comprehensive Designer's Manual entitled, "Understanding and Designing with FET's."



# FIELD-EFFECT TRANSISTORS (continued)

## INDEX TO MOTOROLA FIELD-EFFECT TRANSISTORS



The following table lists the Motorola field-effect transistors with reference to selection tables.

Device Type	Table	Device Type	Table	Device Type	Table	Device Type	Table
2N3330	3	2N4858	2	2N5638	2	MFE2011	2
2N3365	3	2N4858A	2	2N5639	2	MFE2012	2
2N3366	3	2N4859	2	2N5640	2	MFE2093	3,4
2N3367	3	2N4859A	2	2N5653	2	MFE2094	3,4
2N3796	3	2N4860	2	2N5654	2	MFE2095	3,4
2N3797	3	2N4860A	2	2N5668	1	MFE3001	3
2N3821	3	2N4861	2	2N5669	1	MFE3002	2
2N3822	3	2N4861A	2	2N5670	1	MFE3003	2
2N3823	1	2N5265	3	2N5716	3	MFE3004	1
2N3824	4	2N5266	3	2N5717	3	MFE3005	1
2N3909	3	2N5267	3	2N5718	3	MFE3006	1
2N3909A	3	2N5268	3	2N5797	3	MFE3007	1
2N3970	2	2N5269	3	2N5798	3	MFE3008	1
2N3971	2	2N5270	3	2N5799	3	MFE3020	2
2N3972	2	2N5358	3	2N5800	3	MFE3021	2
2N3993	3	2N5359	3	3N124	3,4	MFE4007	3
2N3994	3	2N5360	3	3N125	3,4	MFE4008	3
2N3994A	3	2N5361	3	3N126	3,4	MFE4009	3
2N4066	3	2N5362	3	3N128	3	MFE4010	3
2N4067	3	2N5363	3	3N140	1	MFE4011	3
2N4091	2	2N5364	3	3N155	2,4	MFE4012	3
2N4092	2	2N5457	3	3N155A	2,4	MFE5000	3
2N4093	2	2N5458	3	3N156	2,4	MMF1	5
2N4220	3,4	2N5459	3	3N156A	2,4	MMF2	5
2N4220A	3,4	2N5460	3	3N157	3	MMF3	5
2N4221	3,4	2N5461	3	3N157A	3	MMF4	5
2N4221A	3,4	2N5462	3	3N158	3	MMF5	5
2N4222	3,4	2N5463	3	3N158A	3	MMF6	5
2N4222A	3,4	2N5464	3	3N169	2,4	MMT3823	6
2N4223	1	2N5465	3	3N170	2,4	MPF102	1,3
2N4224	1	2N5471	3	3N171	2,4	MPF108	1
2N4342	3	2N5472	3	MFE120	1	MPF109	3
2N4351	4	2N5473	3	MFE121	1	MPF111	3
2N4352	4	2N5474	3	MFE122	1	MPF112	3
2N4360	3	2N5475	3	MFE2000	1	MPF120	1
2N4391	2	2N5476	3	MFE2001	1	MPF121	1
2N4392	2	2N5484	1,3	MFE2004	2	MPF122	1
2N4393	2	2N5485	1,3	MFE2005	2	MPF161	3
2N4416	1	2N5486	1,3	MFE2006	2	MPF256	3
2N4856	2	2N5555	2,4	MFE2007	2	MPF820	1
2N4856A	2	2N5556	3	MFE2008	2	MPF4391	2
2N4857	2	2N5557	3	MFE2009	2	MPF4392	2
2N4857A	2	2N5558	3	MFE2010	2	MPF4393	2



FIELD EFFECT TRANSISTORS (continued)

TABLE 1 – RF AMPLIFIERS AND MIXERS

High performance single and dual gate devices specifically designed for RF applications. The transistors are listed first in order of decreasing specified test frequency; then in order of decreasing power gain ( $G_{ps}$ ) and noise figure (NF).

Test Frequency MHz	G <sub>ps</sub> dB Min	G <sub>c</sub> dB Min	NF dB Max	C <sub>rss</sub> pF Max	C <sub>oss</sub> pF Max	Device Type	Case	Comments
N-CHANNEL J FETs Depletion								
400	10	—	4.0	0.8	2.0	2N4416	20	Box Sort, Color Coded 2:1 I <sub>DSS</sub> Ratios
400	10	—	4.0	1.0	2.0	2N5486	29	
400	10	—	4.0	1.0	2.0	2N5485	29	
400	10	—	4.0	1.0	2.0	MFE2000	20	
400	10	—	4.0	1.0	2.0	MFE2001	↓	
200	10	—	5.0	2.0	—	2N4223		
200	—	—	—	2.0	—	2N4224	↓	
100	—	—	2.5	2.0	—	2N3823#		
100	16	—	3.0	1.0	2.0	2N5484	29	
100	16	—	2.5	3.0	4.0	2N5668	↓	
100	16	—	2.5	3.0	4.0	2N5669		
100	16	—	2.5	3.0	4.0	2N5670		
100	—	—	—	3.0	—	MPF102		
100	—	—	3.0	2.5	—	MPF108		
100	—	—	4.0	3.5†	3.5†	MPF820		
N-CHANNEL MOS FETs Depletion/Enhancement								
400	10	—	4.5	0.2	—	MFE3005	20	Dual Gate — Mixer
244	—	12	—	0.023†	4.0	MPF122	206	
244	—	12	—	0.023†	4.0	MFE122	20	Dual Gate — Mixer
200	18	—	4.0	0.02†	3.5	MFE3007	20	Dual Gate
200	17	—	5.0	0.023†	3.5	MPF121	206	Dual Gate
200	14‡	10	—	0.02†	4.0	MFE3008	20	Dual Gate — Mixer
200	17	—	5.0	0.023†	3.5	MFE121	↓	Dual Gate
200	16	—	4.5	0.03	—	3N140		Dual Gate
200	16	—	4.5	0.2	—	MFE3004	↓	Dual Gate
105	17	—	5.0	0.023†	4.0	MPF120	206	
105	17	—	5.0	0.023†	4.0	MFE120	20	Dual Gate
104	—	15	—	0.023†	4.0	MPF122	206	Dual Gate — Mixer
104	—	15	—	0.023†	4.0	MFE122	20	Dual Gate — Mixer
100	20	—	4.5	0.02†	4.0	MFE3006	↓	Dual Gate
100	14‡	14	—	0.02†	4.0	MFE3008		Dual Gate — Mixer
60	20	—	5.0	0.023†	3.5	MPF121	206	Dual Gate
60	20	—	5.0	0.023†	3.5	MFE121	20	Dual Gate

† Typical  
‡ Conversion Gain, Output frequency = 30 MHz  
# 2N3823JAN Available

TABLE 2 – CHOPPERS

Because FETs have no offset voltage they are particularly well suited for chopper applications. Devices in this table are designed for low  $r_{ds(on)}$ , low  $C_{rss}$  and fast switching time. The FETs are listed first in order of decreasing  $V_{(BR)GSS}$ , increasing  $r_{ds(on)}$ , then in order of increasing  $C_{rss}$  and  $I_{DSS}$ .

$V_{(BR)GSS}$ Volts Min	$r_{ds(on)}$ Ohms Max	$C_{rss}$ pF Max	$I_{DSS}$ mA Min	$I_{D(off)}$ nA Max	Device Type	Case
N-CHANNEL J FETs DEPLETION						
-40 ↓	25	4.0	50	0.25	2N4856A	22 ↓
	25	8.0	50	0.25	2N4856	
	30	3.5	50	0.1	2N4391	
	30	5.0	30	0.2	2N4091	
	30	6.0	50	0.25	2N3970	



FIELD EFFECT TRANSISTORS (continued)

TABLE 2 (continued)

$V_{(BR)GSS}$ Volts Min	$r_{ds(on)}$ Ohms Max	$C_{rss}$ pF Max	$I_{DSS}$ mA Min	$I_{D(off)}$ nA Max	Device Type	Case		
N-CHANNEL J FETs DEPLETION (continued)								
-40 ↓	40	3.5	20	0.25	2N4857A	22 ↓		
	40	8.0	20	0.25	2N4857			
	50	5.0	15	0.2	2N4092			
	60	3.5	25	0.1	2N4392			
	60	3.5	8.0	0.25	2N4858A			
	60	6.0	25	0.25	2N3971			
	60	8.0	8.0	0.25	2N4858			
	80	5.0	8.0	0.2	2N4093			
	100	3.5	5.0	0.1	2N4393			
	100	6.0	5.0	0.25	2N3972			
-30 ↓	25	4.0	50	0.25	2N4859A	29 ↓		
	25	8.0	50	0.25	2N4859			
	30	3.5	60	1.0	MPF4391			
	30	4.0	50	1000	2N5638			
	30	5.0	30	0.2	MFE2006			
	40	3.5	20	0.25	2N4860A			
	40	8.0	20	0.25	2N4860			
	50	3.5	40	1.0	2N5653			
	50	5.0	15	0.2	MFE2005			
	60	3.5	25	1.0	MPF4392			
-25 ↓	60	3.5	8.0	0.25	2N4861A	22 ↓		
	60	4.0	25	1000	2N5639			
	60	8.0	8.0	0.25	2N4861			
	80	5.0	8.0	0.2	MFE2004			
	100	3.5	5.0	1.0	MPF4393			
	100	3.5	15	1.0	2N5654			
	100	4.0	5.0	1000	2N5640			
	10	20	100	3.0	MFE2012			
	15	20	40	3.0	MFE2011			
	20	15	50	2.0	MFE2009			
	25	20	15	3.0	MFE2010	29 ↓		
	30	15	20	2.0	MFE2008			
	40	15	8.0	3.0	MFE2007			
	150	1.2	15	10	2N5555 §			
	N-CHANNEL MOS FETs ENHANCEMENT							
	±30 ↓	100	1.0	10†	—		MFE3002	20 ↓
	±25	200	1.3	10†	—		3N169#	
	↓	200	1.3	10†	—		3N170#	
	↓	200	1.3	10†	—		3N171#	
	P-CHANNEL MOS FETs ENHANCEMENT							
±35 ↓	300	1.3	0.25†	—	3N155A*	20 ↓		
↓	300	1.3	0.25†	—	3N156A*			
↓	600	1.3	1.0†	—	3N155*			
↓	600	1.3	1.0†	—	3N156*			
±30	200	1.0	10†	—	MFE3003	642 ↓		
-25	500	1.5	10†	—	MFE3020			
-25	250	1.5	10†	—	MFE3021			

\* Designers Data Sheet      † nA Max  
# Low  $V_{GS(th)}$ , High Speed  
§ High Speed,  $t_{(on)} = 10$  ns Max

TABLE 3 – GENERAL-PURPOSE AMPLIFIERS

This table includes a wide selection of N- and P-channel field-effect transistors designed for small-signal amplification at low and moderate frequencies (to 30 MHz). The transistors are listed in order of increasing Gate-Source Breakdown Voltage [ $V_{(BR)GSS}$ ], then in order of decreasing Zero-Gate Voltage Drain Current ( $I_{DSS}$ ) and Forward Transfer Admittance ( $y_{fs}$ ).

$V_{(BR)GSS}$ Volts Min	$I_{DSS}$ mA Min/Max	$ y_{fs} $ $\mu$ mhos mmhos* Min/Max	Device Type	Case	Comments
N-CHANNEL J FETs DEPLETION					
-20 ↓	0.5/20	500/—	MPF111	29 ↓	Formerly MPF107 Formerly MPF105 Formerly MPF106 Formerly MPF104
-25	8.0/20	4000/8000	2N5486		
↓	4.0/16	2000/6000	2N5459		
↓	4.0/10	3500/7000	2N5485		
↓	2.0/9.0	1500/5500	2N5458		



FIELD EFFECT TRANSISTORS (continued)

TABLE 3 (continued)

$V_{(BR)GSS}$ Volts Min	$I_{DSS}$ mA Min/Max	$ y_{fs} $ $\mu$ mhos mmhos*	Device Type	Case	Comments
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N-CHANNEL J FETs DEPLETION (continued)

-25 ↓  -30 ↓  -40 ↓  -50 ↓	2.0/20	2000/7500	MPF102	29	Formerly MPF103 { 2:1 $I_{DSS}$ Ratio Box Sort, Color Coded 2:1 $I_{DSS}$ Ratio, Box Sort, Color Coded  NF = 2.5 dB (Max) @ f = 100 Hz $e_N$ = 35 NV/ $\sqrt{Hz}$ (Max) @ f = 10 Hz  NF = 2.5 dB (Max) @ f = 100 Hz $e_N$ = 35 NV/ $\sqrt{Hz}$ (Max) @ f = 10 Hz  NF = 2.5 dB (Max) @ f = 100 Hz $e_N$ = 35 NV/ $\sqrt{Hz}$ (Max) @ f = 10 Hz  2:1 $I_{DSS}$ Ratios  $e_N$ = 75 NV/ $\sqrt{Hz}$ @ f = 1 kHz  $e_N$ = 75 NV/ $\sqrt{Hz}$ @ f = 1 kHz Tetrode Connected  Tetrode Connected  Tetrode Connected
	1.0/25	1000/7500	MPF112	20 ↓  22 20  22 20 22 20  22 20 22 20	
	1.0/5.0	1000/5000	2N5457		
	1.0/5.0	3000/6000	2N5484		
	0.5/24	800/6000	MPF109		
	6.0/13	6.0*/—	MPF256		
	5.0/15	2500/6000	2N4222		
	5.0/15	2500/6000	2N4222A		
	4.0/10	1500/6500	2N5558		
	2.0/6.0	2000/5000	2N4221		
2.0/6.0	2000/5000	2N4221A			
2.0/5.0	1500/6500	2N5557			
0.5/3.0	1000/4000	2N4220			
0.5/3.0	1000/4000	2N4220A			
0.5/2.5	1500/6500	2N5556			
9.0/18	2700/6500	2N5364*			
7.0/14	2500/6000	2N5363*			
4.0/8.0	2000/5500	2N5362*			
2.5/5.0	1500/4500	2N5361*			
1.5/3.0	1400/3200	2N5360*			
0.8/4.0	400/2000	2N3365			
0.8/1.6	1200/3600	2N5359*			
0.8/4.0	500/2000	2N5718			
0.5/1.0	1000/3000	2N5358*			
0.2/1.0	250/1000	2N3366			
0.2/1.0	400/1600	2N5717			
0.05/0.25	200/1000	2N5716			
0.05/0.25	100/1000	2N3367			
3.0/9.0	1200/3600	3N126			
2.0/10	3000/6500	2N3822#			
1.5/4.5	800/2400	3N125			
1.0/3.0	400/800	MFE2095			
0.5/2.5	1500/4500	2N3821			
0.4/1.4	350/700	MFE2094			
0.2/2.0	500/2000	3N124			
0.1/0.7	250/500	MFE2093			

N-CHANNEL MOS FETs Depletion/Enhancement

-50	5.0/25	5000/12000	3N128	20	$I_{GSS}$ = 0.05 mAdc (Max)
±30	2.0/6.0	1500/3000	2N3797	22	$I_{GSS}$ = 1.0 pAdc (Max)
±30	0.5/6.0	700/3500	MFE3001	20	
±30	0.5/3.0	900/1800	2N3796	22	$I_{GSS}$ = 1.0 pAdc (Max)

P-CHANNEL J FETs DEPLETION

+20	3.0/30	2000/8000	2N4360	29	2:1 $I_{DSS}$ Ratio, Formerly MPF153
↓	1.0/15	2200/5000	2N3909A	20	
↓	0.3/15	1000/5000	2N3909	20	
↓	—	1500/3000	2N3330	20	
+25	10/—	6000/12000	2N3993	20	2:1 $I_{DSS}$ Ratio, Formerly MPF151
↓	4.0/12	2000/6000	2N4342	29	
↓	2.0/—	5000/10000	2N3994A	20	
↓	2.0/—	4000/10000	2N3994	20	
+40	7.0/14	2500/5000	MFE4012*	20	2:1 $I_{DSS}$ Ratio, NF = 1.8 dB (Typ) @ 1 kHz
↓	4.0/16	2000/6000	2N5462	29	
↓	4.0/8.0	2200/4500	MFE4011*	20	
↓	1.0/5.0	1000/4000	2N5460	29	
↓	0.8/2.0	260/650	2N5476	20	2:1 $I_{DSS}$ Ratio, 2.5:1 $I_{DSS}$ Ratio NF = 1.8 dB (Typ) @ 1 kHz
↓	0.8/1.6	1000/3000	MFE4008*	20	
↓	0.7/2.0	250/700	2N5800	29	
↓	0.5/14	800/6000	MPF161	29	
↓	0.5/1.0	900/2700	MFE4007	20	2:1 $I_{DSS}$ Ratio, 2.5:1 $I_{DSS}$ Ratio NF = 1.8 dB (Typ) @ 1 kHz
↓	0.4/1.0	200/500	2N5475	20	
↓	0.25/1.0	160/500	2N5799	29	
↓	0.2/0.5	160/400	2N5474	20	
↓	0.1/0.25	120/300	2N5473	20	2.5:1 $I_{DSS}$ Ratio NF = 1.8 dB (Typ) @ 1 kHz
↓	0.08/0.4	100/400	2N5798	29	

\* Designers Data Sheet  
# JAN and JANTX Available



# FIELD EFFECT TRANSISTORS (continued)

TABLE 3 (continued)

$V_{(BR)GSS}$ Volts Min	$I_{DSS}$ mA Min/Max	$ V_{fs} $ $\mu$ mhos mmhos* Min/Max	Device Type	Case	Comments
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## P-CHANNEL J FETs DEPLETION (continued)

+40 ↓ +60 ↓	0.05/0.12	90/225	2N5472	20	2.5:1 $I_{DSS}$ Ratio
	0.02/0.1	60/225	2N5797	29	NF = 1.8 dB (Typ) @ 1 kHz
	0.02/0.06	60/180	2N5471	20	2.5:1 $I_{DSS}$ Ratio
	7.0/14	2500/5000	2N5270*	20	2:1 $I_{DSS}$ Ratio,
	4.0/16	2000/6000	2N5465	29	Formerly MPF 156
	4.0/8.0	2200/4500	2N5269*	20	2:1 $I_{DSS}$ Ratio,
	2.5/5.0	2000/4000	2N5268*	20	2:1 $I_{DSS}$ Ratio,
	2.0/9.0	1500/5000	2N5464	29	Formerly MPF 155
	1.5/3.0	1500/3500	2N5267*	20	2:1 $I_{DSS}$ Ratio,
	1.0/5.0	1000/4000	2N5463	29	Formerly MPF 154
	0.8/1.6	1000/3000	2N5266*	↓	2:1 $I_{DSS}$ Ratio,
	0.5/1.0	900/2700	2N5265*	↓	2:1 $I_{DSS}$ Ratio,

## P-CHANNEL MOS FETs ENHANCEMENT

±30	-/1.0†	1500/-	2N4066	642	Dual
±30	-/1.0†	2500/-	2N4067	642	Dual
±35	-/1.0†	1000/4000	3N157*	20	
±35	-/1.0†	1000/4000	3N158*	20	
±40	-/1.0†	2000/8000	MFE5000	605B-02	Dual
±50	-/0.25†	1000/4000	3N157A*	20	
±50	-/0.25†	1000/4000	3N158A*	20	

† nAdc

\* Designers Data Sheet

TABLE 4 – GENERAL-PURPOSE SWITCHES

The devices in this table have low feedback capacitances ( $C_{rss}$ ) and relatively low drain-source resistance, [ $r_{ds(on)}$ ], making them suitable for medium-speed switching applications. The transistors are listed first in order of decreasing Gate-Source Breakdown Voltage [ $V_{(BR)GSS}$ ], then in order of increasing  $r_{ds(on)}$ , decreasing gate cutoff voltage [ $V_{GS(off)}$  or  $V_{GS(th)}$ ] and decreasing  $I_{DSS}$ .

$V_{(BR)GSS}$ Volts Min	$r_{ds(on)}$ Ohms Max	$V_{GS(off)}$ $V_{GS(th)}$ * Volts Max	$I_{DSS}$ $I_{D(on)}$ * mA Min	Device Type	Case	Comments
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## N-CHANNEL J FETs DEPLETION

-50 ↓ -30 ↓ -25	250	—	—	2N3824	20	Tetrode Connected Tetrode Connected Tetrode Connected
	500	6.5	3.0	3N126	↓	
	750	4.0	1.5	3N125	↓	
	1000	2.5	0.2	3N124	↓	
	1300	5.5	1.0	MFE2095	↓	Low Noise
	1600	4.5	0.4	MFE2094	↓	
	2500	2.5	0.1	MFE2093	↓	
	300	8.0	5.0	2N4222	↓	
	300	8.0	5.0	2N4222A	↓	Low Noise High Speed $t_{(on)} = 10$ ns max
	400	6.0	2.0	2N4221	↓	
-30 ↓ -25	400	6.0	2.0	2N4221A	↓	
	500	4.0	0.5	2N4220	↓	
	500	4.0	0.5	2N4220A	↓	
	150	—	15	2N5555	29	

## N-CHANNEL MOS FETs

±30	300	5.0*	3.0*	2N4351	20	Complement to 2N4352 Low $V_{GS(th)}$ , High Speed Low $V_{GS(th)}$ , High Speed Low $V_{GS(th)}$ , High Speed
±25	200	1.5*	10*	3N169	↓	
↓	200	2.0*	10*	3N170	↓	
↓	200	3.0*	10*	3N171	↓	

## P-CHANNEL MOS FETs

±35	300	5.0*	5.0*	3N156A†	20	Complement to 2N4351
↓	300	3.2*	5.0*	3N155A†	↓	
↓	600	5.0*	5.0*	3N156†	↓	
↓	600	3.2*	5.0*	3N155†	↓	
↓	600	5.0*	3.0*	2N4352	↓	
±30	600	5.0*	3.0*	2N4352	↓	

† Designers Data Sheet



FIELD EFFECT TRANSISTORS (continued)

TABLE 5 – MATCHED PAIRS

Each type number in this table represents a pair of devices carefully matched for critical applications such as differential-amplifier service. Each pair is packaged in a metal clip to maintain pair identity.

$I_{DSS}$ mA Min/Max	$ y_{fs} $ $\mu$ hos Min	$ y_{os} $ $\mu$ hos Max	$C_{rss}$ pF Max	NF dB Max	$V_{(BR)GSS}$ Volts Min
4.0/2.0	3500	35	2.0	2.5	30

MATCHING CHARACTERISTICS

$\frac{\Delta V_{GS1} - V_{GS2} }{\Delta T}$ Max $\mu$ V/°C	$ V_{GS1} - V_{GS2} $ mV Max	$ I_{G1} - I_{G2} $ nA Max	$\frac{ y_{fs1} }{ y_{fs2} }$ Min	Device Type	Case
10 10 25 25 50 50	5.0  ↓	10  ↓	0.98 0.98 0.95  ↓	MMF1 MMF2 MMF3 MMF4 MMF5 MMF6	20  ↓

TABLE 6 – MICRO-T FIELD-EFFECT TRANSISTOR N-CHANNEL

Field-Effect Transistor designed for RF Amplifier applications where high density packaging is required.

N-CHANNEL J FET DEPLETION

$V_{(BR)GSS}$ Volts Min	$I_{DSS}$ mA Min/Max	$C_{rss}$ pF Typ	$Re(y_{is})$ $\mu$ hos Typ	NF dB Typ	@ f MHz	Device Type	Case
-30	5.0/20	1.0	500	2.0	100	MMT3823	28





# GERMANIUM POWER TRANSISTORS

This selector guide reflects the "preferred" Motorola germanium power transistors and can be used as a quick reference to find the best device for your applications.




## ALLOY TRANSISTORS

Low-cost devices featuring high current gain and low saturation voltage.




### 3 - AMP

		<b>HIGH-FREQUENCY DRIVER</b> LOW $I_{C10}$ $P_D = 70\text{ W}$ $f_T = 0.4\text{ MHz}$	$h_{FE}$ $I_C = 0.5\text{ A},$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	30 V	45 V	60 V	75 V	90 V
TO-3 (Case 11)	TO-41 <sup>(2)</sup> (Case 4-04)			$V_{CB}$	30 V	45 V	60 V	75 V	90 V
			30-60		2N2137	2N2138	2N2139	2N2140	2N2141
			50-100		2N2142	2N2143	2N2144	2N2145	2N2146
		<b>HIGH-FREQUENCY DRIVER</b> $P_D = 20\text{ W}$	$h_{FE}$ $I_C = 1.0\text{ A},$ $V_{CE} = 0.5\text{ V}$	$V_{CEO}$	30 V	40 V	50 V	60 V	
				$V_{CB}$	40 V	60 V	80 V	100 V	
			20-60		2N1038	2N1039	2N1040	2N1041	
					2N2552	2N2553	2N2554	2N2555	
				2N2556	2N2557	2N2558	2N2559		



### 3.5 - AMP

 (Case 180)	 (Case 183)	 (Case 184)	<b>HIGH-FREQUENCY DRIVER</b> $P_D = 20\text{ W}$	$h_{FE}$ $I_c = 3.0\text{ A},$ $V_{CE} = 1.0\text{ V}$	$V_{CEO}$	30 V	40 V	50 V	60 V	
				$V_{CB}$	40 V	60 V	80 V	100 V		
				<b>20-60</b>		2N1042	2N1043	2N1044	2N1045	
						2N2560	2N2561	2N2562	2N2563	
						2N2564	2N2565	2N2566	2N2567	

### 5 - AMP

 TO-3 (Case 11)	GENERAL-PURPOSE SWITCH AND AMPLIFIER $P_D = 106\text{ W}$ $f_T = 0.25\text{ MHz}$	$h_{FE}$ $I_C = 3.0\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	30V	45V	60V	75V	90V
			$V_{CB}$	40V	60V	80V	100V	120V
		20-40		2N1529	2N1530	2N1531	2N1532	2N1533
		35-70		2N1534	2N1535	2N1536	2N1537	2N1538
 TO-41 <sup>(2)</sup> (Case 4-04)	HIGH-GAIN GENERAL-PURPOSE SWITCH AND AMPLIFIER $P_D = 106\text{ W}$ $f_T = 0.35\text{ MHz}$	$h_{FE}$ $I_C = 3.0\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	30V	45V	60V	75V	90V
			$V_{CB}$	40V	60V	80V	100V	120V
		50-100		2N1539	2N1540	2N1541	2N1542	2N1543
		75-150		2N1544	2N1545	2N1546	2N1547	2N1548
 TO-66 (Case 80-02)	ECONOMY LINE GENERAL-PURPOSE AMPLIFIER AND SWITCH $P_D = 57\text{ W}$ $f_T = 350\text{ kHz}$	$h_{FE}$ $I_C = 0.5\text{ A}$ $V_{CE} = 2.0\text{ Vdc}$	$V_{CES}$	20V	30V	45V	60V	75V
		• 15-350		2N5887	2N5888			
		• 30-70			2N5889	2N5890	2N5891	2N5892
		• 60-120			2N5893	2N5894	2N5895	2N5896
		• 100-200			2N5897	2N5898	2N5899	2N5900
		175-350			2N5901			

### 7 - AMP


 TO-3 (Case 11)	 TO-41 (2) (Case 4-04)	<b>ECONOMY LINE GENERAL-PURPOSE AMPLIFIER AND SWITCH</b>  $P_D = 85\text{ W}$ $f_T = 0.3\text{ MHz}$	$h_{FE}$ $I_C = 3.0\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	30 V	45 V	60 V	60 V	75 V	75 V
			$V_{CB}$	40 V	60 V	75 V	80 V	90 V	100 V	
			30-60				2N3615		2N3616	
			35-70	2N3611	2N3612					
			45-90				2N3617		2N3618	
			60-120	2N3613	2N3614					
30-200		<sup>(4)</sup> MP2060	<sup>(4)</sup> MP2061	<sup>(4)</sup> MP2062		<sup>(4)</sup> MP2063				

See notes on page 5-41






GERMANIUM POWER TRANSISTORS (continued)



10-AMP

 CASE 8	HIGH-VOLTAGE SWITCH $P_o = 56\text{ W}$ $f_r = 300\text{ MHz}$	$h_{FE}$ $I_C = 3.0\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CEO}$	80	120	160
			$V_{CB}$	80	120	160
		20-50		2N6064	2N6065	2N6066


15-AMP

 TO-36 (Case 5)	GENERAL-PURPOSE SWITCH AND AMPLIFIER $P_o = 170\text{ W}$ $f_r = 0.25\text{ MHz}$	$h_{FE}$ $I_C = 5.0\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	40 V	50 V	70 V	80 V
			$V_{CB}$	40 V	50 V	70 V	80 V
		20-40		2N2078	2N2077	2N2076	2N2075
 TO-3 (Case 11A)	HIGH-SPEED SWITCH AND AMPLIFIER $P_o = 106\text{ W}$ $f_r = 0.40\text{ MHz}$	$h_{FE}$ $I_C = 10\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	30 V	45 V	60 V	75 V
			$V_{CB}$	40 V	60 V	80 V	100 V
		10-30		2N1549	2N1550	2N1551	2N1552
 TO-41 <sup>(2)</sup> (Case 4-04)	HIGH-GAIN SWITCH AND AMPLIFIER $P_o = 106\text{ W}$ $f_r = 0.35\text{ MHz}$	$h_{FE}$ $I_C = 10\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CES}$	30 V	45 V	60 V	75 V
			$V_{CB}$	40 V	60 V	80 V	100 V
		30-60		2N1553	2N1554	2N1555	2N1556
		50-100		2N1557	2N1558	2N1559	2N1560




25-AMP

 TO-3 (Case 11A)	HIGH-GAIN SWITCH AND AMPLIFIER $P_o = 106\text{ W}$ $f_r = 0.35\text{ MHz}$	$h_{FE}$ $I_C = 25\text{ A}$ $V_{CE} = 1.0\text{ V}$	$V_{CES}$	35 V	60 V	75 V
			$V_{CB}$	50 V	80 V	100 V
		15-65		2N1162	2N1164	2N1166
 TO-41 <sup>(2)</sup> (Case 4-04)				2N1163	2N1165	2N1167

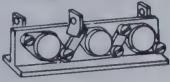
30-AMP

 TO-36 (Case 5)	MEDIUM-CURRENT SWITCH $P_o = 170\text{ W}$ $f_r = 0.25\text{ MHz}$	$h_{FE}$ $I_C = 5.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ( $h_{FE} = 15\text{ min @ } I_C = 25\text{ A}$ )	$V_{CES}$	45 V	60 V	75 V	90 V
			$V_{CB}$	45 V	60 V	75 V	90 V
		50-100		2N2152	2N2153	2N2154	2N2155
		80-160		2N2156	2N2157	2N2158	2N2159

60-AMP

 CASE 7	HIGH-CURRENT — HIGH-GAIN SWITCH $P_o = 170\text{ W}$ $f_r = 0.25\text{ MHz}$	$h_{FE}$ $I_C = 15\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ( $h_{FE} = 12\text{ min @ } I_C = 50\text{ A}$ )	$V_{CES}$	45 V	60 V	75 V	90 V
			$V_{CB}$	45 V	60 V	75 V	90 V
		30-60		MP500	MP501	MP502	MP503
		50-100		MP504	MP505	MP506	MP507
 TO-3 (Case 3A)	HIGH-CURRENT — HIGH-GAIN SWITCH $P_o = 170\text{ W}$ $f_r = 0.45\text{ MHz}$	$h_{FE}$ $I_C = 15\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ( $h_{FE} = 15\text{ min @ } I_C = 60\text{ A}$ )	$V_{CES}$	45 V	60 V	75 V	
			$V_{CB}$	45 V	60 V	75 V	
		60-120		2N4048	2N4049	2N4050	
 TO-41 <sup>(2)</sup> (Case 161)	ECONOMY LINE HIGH-CURRENT — HIGH-GAIN SWITCH $P_o = 170\text{ W}$ $f_r = 0.4\text{ MHz}$	$h_{FE}$ $I_C = 15\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ( $h_{FE} = 15\text{ min @ } I_C = 60\text{ A}$ )	$V_{CES}$	30 V	45 V	60 V	75 V
			$V_{CB}$	30 V	45 V	60 V	75 V
		60-120		2N4276	2N4278	2N4280	2N4282
		80-180		2N4277	2N4279	2N4281	2N4283

150-AMP

 CASE 118	"POWER-PAC" ASSEMBLY MEDIUM VOLTAGE SWITCH $P_o = 250\text{ W}$ $\theta_{JC} = 0.33^\circ\text{C/W}$	$h_{FE}$ $I_C = 150\text{ A}$ , $V_{CE} = 2.0\text{ V}$	$V_{CES}$	60 V	75 V
			$V_{CEO}$	45 V	60 V
		15 Min		MP801 <sup>(1)</sup>	MP800 <sup>(1)</sup>

See notes on page 5-41.




GERMANIUM POWER TRANSISTORS (continued)

DIFFUSED BASE TRANSISTORS





Features graded-base profile for:

- Low emitter-base resistance and high-temperature stability
- High breakdown voltage capability
- Higher frequency response, faster switching speeds



10 - AMP

 TO-3 (Case 11A)	HIGH-SPEED SWITCH $P_o = 70 \text{ W}$	$h_{FE}$ $I_C = 5.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$	$V_{CEO}$	30 V	50 V	70 V
			$V_{CB}$	40 V	80 V	120 V
		50-120		2N2291	2N2292	2N2293
		20-60	$V_{CER}$	40 V	80 V	120 V
			$V_{CB}$	40 V	80 V	120 V
				2N2288	2N2289	2N2290

10 - AMP

 TO-3 (Case 11A)	 TO-41 <sup>(a)</sup> (Case 4-04)	HIGH-VOLTAGE SWITCH $P_o = 85 \text{ W}$ $f_r = 0.7 \text{ MHz}$	$h_{FE}$ $I_C = 3.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$	$V_{CEO}$	80 V	120 V		160 V
				$V_{CB}$	80 V	120 V		160 V
 TO-3 (Case 11)	 TO-41 <sup>(a)</sup> (Case 4-04)	HIGH-VOLTAGE MEDIUM-SPEED SWITCH $P_o = 56 \text{ W}$ $f_r = 5.5 \text{ MHz}$ $f_r = 1.0 \text{ MHz}$ (MP3730, MP3731)	$h_{FE}$	$V_{CES}$	200 V†	150 V	320 V†	200 V
				$V_{CEO}$		250 V		325 V
			20-60 $I_C = 5.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$			2N5324		2N5325
			15 Min $I_C = 2.25 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$			MP3730 <sup>(4)</sup>		
			15 Min $I_C = 6.0 \text{ A}$ , $V_{CE} = 3.0 \text{ V}$				MP3731	

20 - AMP

 TO-3 (Case 11A)	 TO-41 (Case 4-04)	HIGH-SPEED HIGH-VOLTAGE SWITCH $P_o = 85 \text{ W}$ $f_r = 20 \text{ MHz}$	$h_{FE}$ $I_C = 10 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$	$V_{CEO}$	50 V	50 V	75 V	75 V	100 V	100 V
				$V_{CB}$	80 V	100 V	120 V	140 V	140 V	160 V
			25-100		2N2832 <sup>(2)</sup>	MP1612 <sup>(4)</sup>	2N2833 <sup>(2)</sup>	MP1612A <sup>(4)</sup>	2N2834 <sup>(2)</sup>	MP1612B <sup>(4)</sup>

FOR MILITARY APPLICATIONS


JAN 2N174A	MIL-S-19500/13	JAN 2N1412	MIL-S-19500/76	JAN 2N1554A	MIL-S-19500/331
JAN 2N297A	MIL-S-19500/36	JAN 2N1412A	MIL-S-19500/76	JAN 2N1555A	MIL-S-19500/331
JAN 2N665	MIL-S-19500/58	JAN 2N1549A	MIL-S-19500/332	JAN 2N1556A	MIL-S-19500/331
JAN 2N1011	MIL-S-19500/67	JAN 2N1550A	MIL-S-19500/332	JAN 2N2079A	MIL-S-19500/340
JAN 2N1120	MIL-S-19500/68	JAN 2N1551A	MIL-S-19500/332	JAN 2N2528	MIL-S-19500/309
JAN 2N1165	MIL-S-19500/178	JAN 2N1552A	MIL-S-19500/332		
JAN 2N1358	MIL-S-19500/122	JAN 2N1553A	MIL-S-19500/331		

Also available as standard devices.


See notes page 5-41




25 - AMP

 <div>TO-3 (Case 11A)</div> <div>TO-41 <sup>(2)</sup> (Case 4-04)</div>	<b>MEDIUM-CURRENT "ADE"<sup>(5)</sup></b> <b>SWITCH HIGH-GAIN</b> <b>P<sub>0</sub> = 85 W</b>	$h_{FE}$ $I_C = 5.0\text{ A}, V_{CE} = 2.0\text{ V}$	$V_{CEO}$ $V_{CB}$	<b>50 V</b>	<b>60 V</b>	<b>70 V</b>	<b>80 V</b>	
				<b>75 V</b>	<b>75 V</b>	<b>90 V</b>	<b>90 V</b>	
		<b>50 Min</b>		MP600 <sup>(4)</sup>	MP601 <sup>(4)</sup>	MP602 <sup>(4)</sup>	MP603 <sup>(4)</sup>	
	<b>MEDIUM-CURRENT "ADE"<sup>(5)</sup></b> <b>SWITCH HIGH-VOLTAGE</b> <b>P<sub>0</sub> = 106 W</b> <b>f<sub>r</sub> = 0.4 MHz</b>	$h_{FE}$ $I_C = 8.0\text{ A}, V_{CE} = 2.0\text{ V}$	$V_{CEO}$ $V_{CEX}$	<b>30 V</b>	<b>60 V</b>	<b>80 V</b>	<b>100 V</b>	<b>120 V</b>
				<b>60 V</b>	<b>80 V</b>	<b>100 V</b>	<b>120 V</b>	<b>140 V</b>
		<b>25-100</b>						2N5155
		<b>25 Min</b>		MP2000A <sup>(4)</sup>	MP2100A <sup>(4)</sup>	MP2200A <sup>(4)</sup>	MP2300A <sup>(4)</sup>	MP2400A <sup>(4)</sup>


40 - AMP

 <div>CASE 3A (TO-3) 2N5692 Series</div> <div>CASE 161 (TO-41) MP5692 Series</div>	<b>HIGH-CURRENT</b> <b>FAST SWITCHING</b> <b>"ADE" SWITCH</b> <b>P<sub>0</sub> = 120 W</b> <b>f<sub>r</sub> = 0.2 MHz</b>	$h_{FE}$ $I_C = 25\text{ A}, V_{CE} = 2.0\text{ V}$	$V_{CEO}$ $V_{CB}$	<b>30 V</b>	<b>60 V</b>	<b>80 V</b>	<b>100 V</b>	<b>120 V</b>
				<b>50 V</b>	<b>80 V</b>	<b>100 V</b>	<b>120 V</b>	<b>140 V</b>
		<b>10 Min</b> $I_C = 40\text{ A}, V_{CE} = 2.0\text{ V}$			2N5692	2N5693	2N5694	2N5695
					MP5692	MP5693	MP5694	MP5695

60 - AMP

 <div>TO-3 (Case 3A)</div> <div>TO-41 (2) (Case 161)</div>	<b>HIGH-CURRENT — HIGH-VOLTAGE “ADE”<sup>⊙</sup> SWITCH</b> <b>P<sub>0</sub> = 120 W</b> <b>f<sub>r</sub> = 1.0 MHz</b>	$h_{FE}$ $I_C = 25\text{ A}, V_{CE} = 2.0\text{ V}$	$V_{CEO}$	<b>60 V</b>	<b>90 V</b>	<b>120 V</b>	
			$V_{CB}$	<b>80 V</b>	<b>110 V</b>	<b>140 V</b>	
		<b>20-60</b> ( $h_{FE} = 10\text{ min @ } I_C = 60\text{ A}$ )			2N5435	2N5436	2N5437
		<b>40-120</b> ( $h_{FE} = 15\text{ min @ } I_C = 60\text{ A}$ )			2N5438	2N5439	2N5440

150 - AMP

 CASE 118	<b>"POWER-PAC" ASSEMBLY HIGH VOLTAGE SWITCH</b> $P_D = 250\text{ W}$ $\theta_{JC} = 0.33^\circ\text{C/W}$	$h_{FE}$ $I_C = 150\text{ A}$ $V_{CE} = 2.0\text{ V}$	$V_{CB}$	80 V	110 V	140 V
			$V_{CEO}$	60 V	90 V	120 V
		20 Min		MP900	MP901	MP902

Notes:

<sup>(1)</sup> For epoxy encapsulated "PAC" add "A" to device type (i.e. MP801A)

<sup>(2)</sup> TO-41, add the prefix "MP" in place of "2N" (i.e. MP2137)

<sup>(3)</sup> TO-41, order odd numbered devices (i.e. 2N1163)

<sup>(4)</sup> Special order for TO-41; contact your local Motorola Sales office

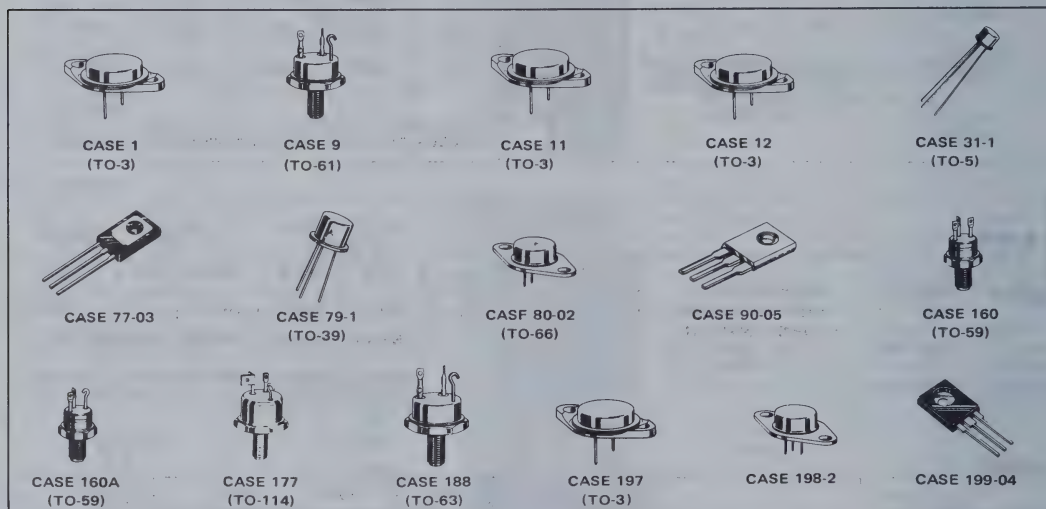
<sup>(5)</sup> Alloy Diffused Epitaxial Process



# SILICON POWER TRANSISTORS

*This Selector Guide is published by Motorola to help the designer choose the best silicon power transistors for his new equipment and find suitable replacements for devices used in older designs. It is a comprehensive listing of the industry's most complete line of PNP and NPN silicon power transistors, and contains over 200*

*devices rated at currents between 100 mA and 60 amperes, and at voltages up to 600 volts. The transistors are in fifteen popular cases, including three low-cost plastic packages and hermetically sealed cases capable of dissipating up to 300 watts.*



## TABLE OF CONTENTS

The first table of the guide is a numerical-alphabetical index to all silicon power transistors manufactured by Motorola. The number of the selection table in which each device is further characterized is also listed.

### COMPLEMENTARY TRANSISTORS

One reason for the wide use of Motorola power transistors is the design flexibility that results from the large number of "off the shelf" complementary transistors in the line. For convenience in choosing complements, a table of complementary power transistors is given following the index. A selection can be made from the complements on the basis of maximum collector current, case, and voltage.

### SELECTION TABLES

The major part of this guide is composed of selection tables. These tables list all Motorola silicon power transistors in an order that makes it easy for the user to find a device that satisfies his requirements. Each

table contains devices in the same package, and the table is separated first into NPN and PNP devices.

Within each table, the transistors are listed first in order of increasing breakdown voltage, then in increasing order of current and  $h_{FE}$ .

The tables list only the most basic characteristics of each device. For complete information on any Motorola power transistor refer to the individual data sheet or the appropriate pages in the Semiconductor Data Library.

If a standard part listed in this selector guide does not fulfill all requirements, a special part might be desirable. Motorola has the production capability and flexibility to supply devices especially tailored to specific OEM application needs. Where suitable power transistors cannot be selected from this guide, inquiries should be made at the nearest Motorola sales office.



## INDEX

Device Type	Table #	Device Type	Table #	Device Type	Table #	Device Type	Table #
2N1724	9	2N4905	1	2N5758	1	2N6185	8
2N1725	9	2N4906	1	2N5759	1	2N6186	8
2N3021	1	2N4910	4	2N5760	1	2N6187	8
2N3022	1	2N4911	4	2N5867	1	2N6188	8
2N3023	1	2N4912	4	2N5868	1	2N6189	8
2N3024	1	2N4913	1	2N5869	1	2N6190	3
2N3025	1	2N4914	1	2N5870	1	2N6191	3
2N3026	1	2N4915	1	2N5871	1	2N6192	3
2N3054	4	2N4918	5	2N5872	1	2N6193	3
2N3054A	4	2N4919	5	2N5873	1	2N6226	1
				2N5874	1	2N6227	1
2N3055	1	2N4920	5				
2N3232	1	2N4921	5	2N5875	1	2N6228	1
2N3235	1	2N4922	5	2N5876	1	2N6229	1
2N3439	2	2N4923	5	2N5877	1	2N6230	1
2N3440	2	2N5050	4	2N5878	1	2N6231	1
2N3441	4	2N5051	4	2N5879	1	2N6233	4
2N3442	1	2N5052	4	2N5880	1	2N6234	4
2N3445	1	2N5067	1	2N5881	1	2N6235	4
2N3446	1	2N5068	1	2N5882	1	2N6253	1
2N3447	1	2N5069	1	2N5883	1	2N6254	1
				2N5884	1	2N6257	1
2N3448	1	2N5157	1				
2N3487	9	2N5190	5	2N5885	1	2N6274	1
2N3488	9	2N5191	5	2N5886	1	2N6275	1
2N3489	9	2N5192	5	2N5974	6	2N6276	1
2N3490	9	2N5193	5	2N5975	6	2N6277	1
2N3491	9	2N5194	5	2N5976	6	2N6278	10
2N3492	9	2N5195	5	2N5977	6	2N6279	10
2N3713	1	2N5241	1	2N5978	6	2N6280	10
2N3714	1	2N5301	1	2N5979	6	2N6281	10
2N3715	1	2N5302	1	2N5980	6	2N6282	12
				2N5981	6	2N6283	12
2N3716	1	2N5303	1				
2N3719	2	2N5304	9	2N5982	6	2N6284	12
2N3720	2	2N5334	3	2N5983	6	2N6285	12
2N3738	4	2N5335	3	2N5984	6	2N6286	12
2N3739	4	2N5336	3	2N5985	6	2N6287	12
2N3740	4	2N5337	3	2N5986	6	2N6294	12
2N3741	4	2N5338	3	2N5987	6	2N6295	12
2N3766	4	2N5339	3	2N5988	6	2N6296	12
2N3767	4	2N5344	4	2N5989	6	2N6297	12
2N3771	1	2N5345	4	2N5990	6	2N6298	12
		2N5346	8	2N5991	6	2N6299	12
2N3772	1						
2N3773	1	2N5347	8	2N6029	1	2N6300	12
2N3788	1	2N5348	8	2N6030	1	2N6301	12
2N3789	1	2N5349	8	2N6031	1	2N6302	1
2N3790	1	2N5427	4	2N6034	13	2N6303	2
2N3791	1	2N5428	4	2N6035	13	2N6306	1
2N3792	1	2N5429	4	2N6036	13	2N6307	1
2N3867	2	2N5430	4	2N6037	13	2N6308	1
2N3868	2	2N5477	8	2N6038	13	2N6315	4
2N3902	1	2N5478	8	2N6039	13	2N6316	4
		2N5479	8	2N6040	13	2N6317	4
2N4231	4						
2N4232	4	2N5480	8	2N6041	13	2N6318	4
2N4233	4	2N5629	1	2N6042	13	2N6338	1
2N4234	2	2N5630	1	2N6043	13	2N6339	1
2N4235	2	2N5631	1	2N6044	13	2N6340	1
2N4236	2	2N5632	1	2N6045	13	2N6341	1
2N4237	2	2N5633	1	2N6049	4	2N6355	12
2N4238	2	2N5634	1	2N6050	12	2N6356	12
2N4239	2	2N5655	5	2N6051	12	2N6357	12
2N4348	1	2N5656	5	2N6052	12	2N6358	12
		2N5657	5	2N6053	12	2N6359	1
2N4398	1						
2N4399	1	2N5679	2	2N6054	12	2N6360	1
2N4877	3	2N5680	2	2N6055	12	BU105	1
2N4898	4	2N5681	2	2N6056	12	MJ105	1
2N4899	4	2N5682	2	2N6057	12	MJ400	4
2N4900	4	2N5683	1	2N6058	12	MJ410	1
2N4901	1	2N5684	1	2N6059	12	MJ411	1
2N4902	1	2N5685	1	2N6182	8	MJ413	1
2N4903	1	2N5686	1	2N6183	8	MJ420	2
2N4904	1	2N5745	1	2N6184	8	MJ421	2



## INDEX (continued)

Device Type	Table #	Device Type	Table #	Device Type	Table #	Device Type	Table #
MJ423	1	MJ4031	12	MJE341	5	MJE2490	7
MJ424	1	MJ4032	12	MJE341K	7	MJE2491	7
MJ425	1	MJ4033	12	MJE344	5	MJE2520	7
MJ431	1	MJ4034	12	MJE344K	7	MJE2521	7
MJ450	1	MJ4035	12	MJE345	5	MJE2522	7
MJ480	1	MJ4200	12	MJE370	5	MJE2523	7
MJ481	1	MJ4201	12	MJE370K	7	MJE2801	6
MJ490	1	MJ4210	12	MJE371	5	MJE2801K	7
MJ491	1	MJ4211	12	MJE371K	7	MJE2901	6
MJ500	8	MJ4502	1	MJE520	5	MJE2901K	7
MJ501	8	MJ4645	3	MJE520K	7	MJE2955	6
MJ802	1	MJ4646	3	MJE521	5	MJE2955K	7
MJ900	12	MJ4647	3	MJE521K	7	MJE3054	7
MJ901	12	MJ4648	3	MJE700	13	MJE3055	6
MJ920	12	MJ6257	1	MJE701	13	MJE3055K	7
MJ921	12	MJ6700	8	MJE702	13	MJE3370	5
MJ1000	12	MJ6701	8	MJE703	13	MJE3371	5
MJ1001	12	MJ7000	10	MJE710	5	MJE3439	5
MJ1200	12	MJ7200	11	MJE711	5	MJE3440	5
MJ1201	12	MJ7201	11	MJE712	5	MJE3520	5
MJ1800	1	MJ8100	3	MJE720	5	MJE3521	5
MJ2249	4	MJ8101	3	MJE721	5	MJE3738	7
MJ2250	4	MJ8400	1	MJE722	5	MJE3739	7
MJ2251	4	MJ9000	1	MJE800	13	MJE3740	7
MJ2252	4	MJE105	6	MJE801	13	MJE3741	7
MJ2253	4	MJE105K	7	MJE802	13	MJE4918	7
MJ2254	4	MJE170	5	MJE803	13	MJE4919	7
MJ2267	1	MJE171	5	MJE1090	13	MJE4920	7
MJ2268	1	MJE172	5	MJE1091	13	MJE4921	7
MJ2500	12	MJE180	5	MJE1092	13	MJE4922	7
MJ2501	12	MJE181	5	MJE1093	13	MJE4923	7
MJ2801	1	MJE182	5	MJE1100	13	MJE5190	7
MJ2840	1	MJE200	5	MJE1101	13	MJE5192	7
MJ2841	1	MJE205	6	MJE1102	13	MJE5193	7
MJ2901	1	MJE205K	7	MJE1103	13	MJE5194	7
MJ2940	1	MJE210	5	MJE1290	6	MJE5195	7
MJ2941	1	MJE220	5	MJE1291	6	MJE5655	7
MJ2955	1	MJE221	5	MJE1660	6	MJE5656	7
MJ3000	12	MJE222	5	MJE1661	6	MJE5657	7
MJ3001	12	MJE223	5	MJE2010	7	MJE5974	7
MJ3026	1	MJE224	5	MJE2011	7	MJE5975	7
MJ3027	1	MJE225	5	MJE2020	7	MJE5976	7
MJ3028	1	MJE230	5	MJE2021	7	MJE5977	7
MJ3029	1	MJE231	5	MJE2090	13	MJE5978	7
MJ3030	1	MJE232	5	MJE2091	13	MJE5979	7
MJ3101	4	MJE233	5	MJE2092	13	MJE5980	7
MJ3201	4	MJE234	5	MJE2093	13	MJE5981	7
MJ3202	4	MJE235	5	MJE2100	13	MJE5982	7
MJ3260	1	MJE240	5	MJE2101	13	MJE5983	7
MJ3430	1	MJE241	5	MJE2102	13	MJE5984	7
MJ3520	12	MJE242	5	MJE2103	13	MJE5985	7
MJ3521	12	MJE243	5	MJE2160	7	MJE6040	13
MJ3701	4	MJE244	5	MJE2360	7	MJE6041	13
MJ3771	1	MJE250	5	MJE2361	7	MJE6042	13
MJ3772	1	MJE251	5	MJE2370	7	MJE6043	13
MJ4000	12	MJE252	5	MJE2371	7	MJE6044	13
MJ4001	12	MJE253	5	MJE2480	7	MJE6045	13
MJ4010	12	MJE254	5	MJE2481	7		
MJ4011	12	MJE340	5	MJE2482	7		
MJ4030	12	MJE340K	7	MJE2483	7		



COMPLEMENTARY POWER TRANSISTORS

I <sub>C</sub> Max	Package	BV <sub>CEO</sub>	NPN	PNP	Table
1.0 A	TO-5	100	2N5681	2N5679	2
		120	2N5682	2N5680	2
1.5 A	Case 77-03	40	MJE720	MJE710	5
		60	MJE721	MJE711	5
		80	MJE722	MJE712	5
3.0 A	TO-5	40	2N4237	2N4234	2
		60	2N4238	2N4235	2
		80	2N4239	2N4236	2
	Case 77-03	40	2N4921	2N4918	5
		60	2N4922	2N4919	5
		80	2N4923	2N4920	5
		40	MJE180	MJE170	5
		60	MJE181	MJE171	5
		80	MJE182	MJE172	5
		30	MJE520	MJE370	5
		30	MJE520K	MJE370K	7
	Case 77-03	30	MJE3520	MJE3370	5
		40	MJE2520	MJE2370	7
	Case 199-04	60	MJE2521	MJE2371	7
		40	MJE2522	MJE2490	7
		60	MJE2523	MJE2491	7
		40	MJE4921	MJE4918	7
		60	MJE4922	MJE4919	7
		80	MJE4923	MJE4920	7
4.0 A	TO-66	55	2N3054A	2N6049	4
		60	2N3766	2N3740	4
		80	2N3767	2N3741	4
		40	2N4910	2N4898	4
		60	2N4911	2N4899	4
		80	2N4912	2N4900	4
	Case 77-03	40	2N5190	2N5193	5
		60	2N5191	2N5194	5
		80	2N5192	2N5195	5
	Case 77-03	40	2N6037	2N6034	13
		60	2N6038	2N6035	13
		80	2N6039	2N6036	13
	Case 77-03	40	MJE521	MJE371	5
		40	MJE3521	MJE3371	5
	Case 199-04	40	MJE521K	MJE371K	7
	Case 77-03	60	MJE800	MJE700	13
		60	MJE801	MJE701	13
		80	MJE802	MJE702	13
		80	MJE803	MJE703	13
	TO-3	40	MJ480	MJ490	1
		60	MJ481	MJ491	1
		60	MJ4000	MJ4010	12
		80	MJ4001	MJ4011	12
	Case 253	60	MJ4200	MJ4210	12
		80	MJ4201	MJ4211	12
	Case 77-03	40	MJE220	MJE230	5
		40	MJE221	MJE231	5
		40	MJE222	MJE232	5
		60	MJE223	MJE233	5
		60	MJE224	MJE234	5
		60	MJE225	MJE235	5
		80	MJE240	MJE250	5
		80	MJE241	MJE251	5
		80	MJE242	MJE252	5
		100	MJE243	MJE253	5
		100	MJE244	MJE254	5



**SILICON POWER TRANSISTORS (continued)**  
**COMPLEMENTARY POWER TRANSISTORS (continued)**

<b>I<sub>C</sub> Max</b>	<b>Package</b>	<b>BV<sub>CEO</sub></b>	<b>NPN</b>	<b>PNP</b>	<b>Table</b>
<b>4.0 A Contd.</b>	Case 199-04	40	MJE5190	MJE5193	7
		60	MJE5191	MJE5194	7
		80	MJE5192	MJE5195	7
<b>5.0 A</b>	Case 90-05	50	MJE205	MJE 105	6
	Case 199-04	50	MJE205K	MJE 105K	7
	Case 90-05	60	MJE 1100	MJE 1090	13
		60	MJE 1101	MJE 1091	13
		80	MJE 1102	MJE 1092	13
		80	MJE 1103	MJE 1093	13
	TO-3	40	2N5067	2N4901	1
		60	2N5068	2N4902	1
		80	2N5069	2N4903	1
		40	2N4913	2N4904	1
		60	2N4914	2N4905	1
		80	2N4915	2N4906	1
		60	2N5869	2N5867	1
		80	2N5870	2N5868	1
	Case 90-05	40	2N5977	2N5974	6
		60	2N5978	2N5975	6
		80	2N5979	2N5976	6
	TO-39	80	2N5336	2N6190	3
		80	2N5337	2N6191	3
		100	2N5338	2N6192	3
		100	2N5339	2N6193	3
	Case 77-03	25	MJE200	MJE210	5
	Case 199-04	40	MJE5977	MJE5974	7
		60	MJE5978	MJE5975	7
		80	MJE5979	MJE5976	7
		40	MJE2020	MJE2010	7
		60	MJE2021	MJE2011	7
<b>6.0 A</b>	TO-3	100	2N5758	2N6226	1
		120	2N5759	2N6227	1
		140	2N5760	2N6228	1
<b>7.0 A</b>	TO-3	60	2N5873	2N5871	4
		80	2N5874	2N5872	4
	TO-66	60	2N6315	2N6317	4
		80	2N6316	2N6318	4
<b>8.0 A</b>	199-04	60	2N6043	2N6040	13
		80	2N6044	2N6041	13
		100	2N6045	2N6042	13
	TO-3	60	2N6055	2N6053	12
		80	2N6056	2N6054	12
	Case 80-02	60	2N6300	2N6298	12
		80	2N6301	2N6299	12
	TO-3	60	MJ1000	MJ900	12
		80	MJ1001	MJ901	12
	90-05	60	MJE 6043	MJE 6040	13
		80	MJE 6044	MJE 6041	13
		100	MJE 6045	MJE 6042	13
<b>10 A</b>	Case 90-05	60	MJE2801	MJE2901	6
		60	MJE3055	MJE2955	6
	Case 199-04	60	MJE2801K	MJE2901K	7
		60	MJE3055K	MJE2955K	7
	TO-3	60	2N3713	2N3789	1
		80	2N3714	2N3790	1
		60	2N3715	2N3791	1
		80	2N3716	2N3792	1



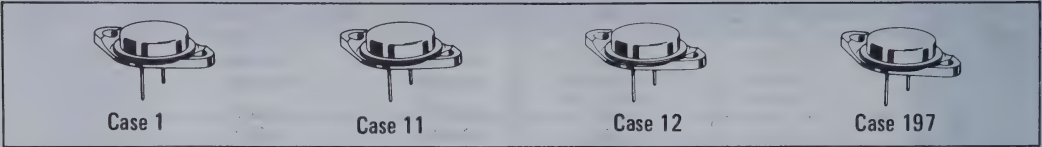
SILICON POWER TRANSISTORS (continued)  
COMPLEMENTARY POWER TRANSISTORS (continued)

I <sub>C</sub> Max	Package	BV <sub>CEO</sub>	NPN	PNP	Table
10 A Contd.	TO-3	60	2N3055	2N4908	1
		60	MJ2840	MJ2940	1
		80	MJ2841	MJ2941	1
		60	2N5877	2N5875	1
		80	2N5878	2N5876	1
		100	2N5632	2N6229	1
		120	2N5633	2N6230	1
		140	2N5634	2N6231	1
	TO-59	80	2N5477	2N6182	8
		80	2N5478	2N6183	8
		100	2N5479	2N6184	8
		100	2N5480	2N6185	8
		80	2N5346	2N6186	8
		80	2N5347	2N6187	8
		100	2N5348	2N6188	8
		100	2N5349	2N6189	8
	TO-3	60	MJ3000	MJ2500	12
		80	MJ3001	MJ2501	12
12 A	Case 90-05	40	2N5989	2N5986	6
		60	2N5990	2N5987	6
		80	2N5991	2N5988	6
	TO-3	60	2N6057	2N6050	12
		80	2N6058	2N6051	12
		100	2N6059	2N6052	12
15 A	Case 90-05	40	MJE1660	MJE1290	6
		60	MJE1661	MJE1291	6
	TO-3	40	MJ2801	MJ2901	1
		60	2N5881	2N5879	1
		80	2N5882	2N5880	1
		60	2N3055	MJ2955	1
16 A	TO-3	60	MJ4033	MJ4030	12
		80	MJ4034	MJ4031	12
		100	MJ4035	MJ4032	12
		100	2N5629	2N6029	1
		120	2N5630	2N6030	1
		140	2N5631	2N6031	1
20 A	TO-3	80	2N5303	2N5745	1
		60	2N6282	2N6285	12
		80	2N6283	2N6286	12
		100	2N6284	2N6287	12
25 A	TO-3	60	2N5885	2N5883	1
		80	2N5886	2N5884	1
30 A	TO-3	40	2N5301	2N4398	1
		60	2N5302	2N4399	1
		90	MJ802	MJ4502	1
50 A	TO-3	60	2N5685	2N5683	1
		80	2N5686	2N5684	1

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TABLE 1 – TO-3



BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case	Device Type
NPN									
40 ↓	4.0	30/200	1.0	1.2	3.0	87.5	4.0	11	MJ480
	5.0	20/180	1.0	1.5	5.0	87.5	4.0	11	2N5067
	5.0	25/100	2.5	1.5	5.0	87.5	4.0	11	2N4913
	15	15/60	8.0	1.5	8.0	115	1.0	11	MJ2801
	20	15/75	8.0	0.7	8.0	150	0.2	11	2N6257
	20	15/75	8.0	0.7	8.0	200	40	11	MJ6257
	30	16/60	15	3.0	30	200	2.0	12	2N5301
	30	15/60	15	2.0	15	150	0.2	11	2N3771
	30	15/60	15	1.0	15	150	2.0	11	MJ3771
	15	20/70	3.0	4.0	15	115	—	11	2N6253
45	10	20/70	4.0	1.1	4.0	115	1.0	11	2N3235
55	4.0	30/200	1.0	1.2	3.0	87.5	4.0	11	MJ481
60	5.0	20/80	1.0	1.5	5.0	87.5	4.0	11	2N5068
↓	5.0	20/100	1.5	1.0	2.0	87.5	4.0	11	2N5869
	5.0	25/100	2.5	1.5	5.0	87.5	4.0	11	2N4914
	7.0	20/100	2.5	1.0	4.0	100	4.0	11	2N5873
	7.5	15/75	3.0	2.5	3.0	115	1.0	11	2N3232
	7.5	20/60	3.0	1.5	3.0	115	10	11	2N3445
	7.5	40/120	5.0	1.5	5.0	115	10	11	2N3447
	10	15/—	3.0	1.0	5.0	150	2.5	11	2N3713
	10	20/100	4.0	1.0	5.0	150	4.0	11	2N5877
	10	20/100	3.0	—	—	150	2.0	11	MJ2840
	10	30/—	3.0	0.8	5.0	150	2.5	11	2N3715
↓	15	20/70	4.0	8.0	10	115	1.0	11	2N3055
	15	20/100	6.0	1.0	7.0	160	4.0	11	2N5881
	20	15/60	10	1.4	10	150	0.2	11	2N3772
	20	15/60	10	1.0	10	150	2.0	11	MJ3772
	25	20/100	10	1.0	15	200	4.0	11	2N5885
	30	15/60	15	3.0	30	200	2.0	12	2N5302
	50	15/60	25	1.0	25	300	2.0	197	2N5685
	5.0	20/80	1.0	1.5	5.0	87.5	4.0	11	2N5069
	5.0	20/100	1.5	1.0	2.0	87.5	4.0	11	2N5870
	5.0	25/100	2.5	1.5	5.0	87.5	4.0	11	2N4915
↓	7.0	20/100	2.5	1.0	4.0	100	4.0	11	2N5874
	7.5	20/60	3.0	1.5	3.0	115	10	11	2N3446
	7.5	40/120	5.0	1.5	5.0	115	10	11	2N3448
	10	15/—	3.0	1.0	5.0	150	2.5	11	2N3714
	10	20/100	4.0	1.0	5.0	150	4.0	11	2N5878
	10	20/100	4.0	—	—	150	2.0	11	MJ2841
	10	30/—	3.0	0.8	5.0	150	2.5	11	2N3716
	16	15/60	8.0	1.4	8.0	150	200K	11	2N6359
	15	20/70	5.0	4.0	15	150	—	11	2N6254
	15	20/100	6.0	1.0	7.0	160	4.0	11	2N5882
↓	20	15/60	10	2.0	20	200	2.0	12	2N5303
	25	20/100	10	1.0	15	200	4.0	11	2N5886
	50	15/60	25	1.0	25	300	2.0	197	2N5686
	30	25/100	7.5	0.8	7.5	200	—	12	MJ802
	6.0	25/100	3.0	1.0	3.0	150	1.0	11	2N5758
	10	25/100	5.0	2.0	10	150	1.0	11	2N5632
	12	15/60	6.0	1.0	6.0	150	200K	11	2N6360
	16	25/100	8.0	1.0	10	200	1.0	11	2N5629
	25	30/120	10	1.0	10	200	40	11	2N6338
	50	30/120	20	1.0	20	250	30	197	2N6274
↓	120	6.0	20/80	3.0	1.0	150	1.0	11	2N5759
	120	10	15/60	5.0	2.0	120	0.2	11	2N4348



TABLE 1 (continued)

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case	Device Type
NPN									
120	10	20/70	3.0	5.0	10	117	—	11	2N3442
↓	10	20/80	4.0	2.0	10	150	1.0	11	2N5633
	16	15/60	8.0	0.8	8.0	150	0.2	11	2N6302
	16	15/60	8.0	0.8	8.0	200	1.0	11	MJ6302
	16	20/80	8.0	1.0	10	200	1.0	11	2N5630
	25	30/120	10	1.0	10	200	40	11	2N6339
↓	50	30/120	20	1.0	20	250	30	197	2N6275
140	6.0	15/60	3.0	1.0	3.0	150	1.0	11	2N5760
↓	10	15/60	5.0	2.0	10	150	1.0	11	2N5634
	16	15/60	8.0	4.0	16	150	0.8	11	2N3773
	16	15/60	8.0	1.0	10	200	1.0	11	2N5631
↓	25	30/120	10	1.0	10	200	40	11	2N6340
	50	30/120	20	1.0	20	250	30	197	2N6276
150	25	30/120	10	1.0	10	200	40	11	2N6341
↓	50	30/120	20	1.0	20	250	30	197	2N6277
150	5.0	30/90	1.0	0.8	1.0	100	2.5	11	MJ410
200	3.5	30/—	0.4	—	—	125	—	11	MJ3029
250	5.0	40/120	0.4	—	—	100	—	11	MJ1800
↓	6.0	—	—	6.0	5.5	80	7.5	11	MJ3260
	8.0	15/75	3.0	0.8	3.0	125	5.0	11	2N6306
275	2.0	25/—	0.25	—	—	80	—	11	MJ3026
300	2.0	25/—	0.25	—	—	80	—	11	MJ3027
↓	3.5	25/—	0.3	—	—	100	—	11	MJ3028
	5.0	15/45	2.5	0.9	2.5	125	2.5	11	MJ3430
	5.0	30/90	1.0	0.8	1.0	100	2.5	11	MJ411
↓	8.0	15/75	3.0	0.8	3.0	125	5.0	11	2N6307
325	2.0	20/180	0.5	1.0	1.5	100	—	11	2N3788
↓	3.5	3.75/—	3.0	2.0	3.0	125	—	11	MJ3030
	10	15/35	2.5	0.7	2.5	125	2.5	11	MJ431
	10	30/90	1.0	0.8	1.0	125	2.5	11	MJ423
↓	10	—	—	2.0	6.0	125	—	11	MJ9000
	10	20/80	0.5	0.8	0.5	125	—	11	MJ413
350	5.0	30/90	1.0	0.8	1.0	100	2.5	11	MJ424
350	8.0	12/60	3.0	1.0	3.0	125	50	11	2N6308
↓	3.5	30/90	1.0	2.5	2.5	100	2.8	11	2N3902
400	5.0	15/35	2.5	0.7	2.5	125	2.5	11	2N5241
↓	5.0	30/90	1.0	0.8	1.0	100	2.5	11	MJ425
500	3.5	30/90	1.0	2.5	3.5	100	2.8	11	2N5157
1400*	2.5	—	—	5.0	2.5	10	7.5#	11	MJ105
↓	4.0	—	—	2.0	3.0	125	—	11	MJ8400
1400*	2.5	—	—	5.0	2.5	10	7.5#	11	BU105
PNP									
30	3.0	20/60	1.0	1.5	3.0	25	60	1	2N3021
30	3.0	50/180	1.0	1.0	3.0	25	60	1	2N3024
40	4.0	30/200	1.0	1.2	3.0	87.5	4.0	11	MJ490
↓	5.0	20/80	1.0	1.5	5.0	87.5	4.0	11	2N4901
	5.0	20/100	4.0	1.0	4.0	150	3.0	11	MJ2267
	5.0	25/100	2.5	1.5	5.0	87.5	4.0	11	2N4904
	15	15/60	8.0	1.5	8.0	115	1.0	11	MJ2901
↓	30	15/60	15	2.0	20	200	4.0	12	2N4398
	30	20/—	10	1.0	10	150	2.0	12	MJ450
45	3.0	20/60	1.0	1.5	3.0	25	60	1	2N3022
↓	3.0	50/180	1.0	1.0	3.0	25	60	1	2N3025
45	5.0	20/100	4.0	1.0	4.0	150	3.0	11	MJ2268
55	3.0	20/60	1.0	1.5	3.0	25	60	1	2N3023
60	3.0	50/180	1.0	1.0	3.0	25	60	1	2N3026
↓	4.0	30/200	1.0	1.2	3.0	87.5	4.0	11	MJ491
	5.0	20/80	1.0	1.5	5.0	87.5	4.0	11	2N4902
	5.0	20/100	1.5	1.0	2.0	87.5	4.0	11	2N5867
↓	5.0	25/100	2.5	1.5	5.0	87.5	4.0	11	2N4905



TABLE 1 (continued)

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case	Device Type
PNP									
60 ↓	7.0	20/100	2.5	1.0	4.0	100	4.0	11	2N5871
	10	15/—	3.0	1.0	4.0	150	4.0	11	2N3789
	10	20/100	3.0	—	—	150	4.0	11	MJ2940
	10	20/100	4.0	1.0	5.0	150	4.0	11	2N5875
	10	30/—	3.0	1.0	5.0	150	4.0	11	2N3791
	15	20/70	4.0	1.1	4.0	150	4.0	11	MJ2955
	15	20/100	6.0	1.0	7.0	160	4.0	11	2N5879
	16	1000/—	10	2.5	10	150	—	11	MJ4030
	25	20/100	10	1.0	15	200	4.0	11	2N5883
	30	15/60	15	2.0	20	200	4.0	12	2N4399
	50	15/60	25	1.0	25	300	2.0	197	2N5683
	80	20/80	1.0	1.5	3.0	87.5	4.0	11	2N4903
	5.0	20/100	1.5	1.0	2.0	87.5	4.0	11	2N5868
	5.0	25/100	2.5	1.5	5.0	87.5	4.0	11	2N4906
	7.0	20/100	2.5	1.0	4.0	100	4.0	11	2N5872
↓ 80 ↓	10	15/—	3.0	1.0	4.0	150	4.0	11	2N3790
	10	20/100	4.0	—	—	150	4.0	11	MJ2941
	10	20/100	4.0	1.0	5.0	150	4.0	11	2N5876
	10	30/—	3.0	1.0	5.0	150	4.0	11	2N3792
	15	20/100	6.0	1.0	7.0	160	4.0	11	2N5880
	20	15/60	10	2.0	20	200	2.0	12	2N5745
	25	20/100	10	1.0	15	200	4.0	11	2N5884
	50	15/60	25	1.0	25	300	2.0	197	2N5684
	90	25/100	7.5	0.8	7.5	200	—	12	MJ4502
	100	25/100	3.0	1.0	3.0	150	1.0	11	2N6226
	10	25/100	5.0	1.0	7.5	150	1.0	11	2N6229
	16	25/100	8.0	1.0	10	200	1.0	11	2N6029
	120	20/80	3.0	1.0	3.0	150	1.0	11	2N6227
	10	20/80	5.0	1.0	7.5	150	1.0	11	2N6230
	16	20/80	8.0	1.0	10	200	1.0	11	2N6030
↓ 140 ↓	6.0	15/60	3.0	1.0	3.0	150	1.0	11	2N6228
	10	15/60	5.0	1.0	7.5	150	1.0	11	2N6231
	16	15/60	8.0	1.0	10	200	1.0	11	2N6031
	16	15/60	8.0	1.0	10	200	1.0	11	2N6031





TABLE 2 – TO-5 Case 31 (1)

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Device Type
NPN								
40	1.0	30/150	0.25	0.6	1.0	6.0	1.0	2N4237
60	1.0	30/150	0.25	0.6	1.0	6.0	1.0	2N4238
80	1.0	30/150	0.25	0.6	1.0	6.0	1.0	2N4239
100	1.0	40/150	0.25	0.6	0.25	10	30	2N5681
120	1.0	40/150	0.25	0.6	0.25	10	30	2N5682
250	0.1	25/250	0.03	5.0	0.03	0.8	15	MJ420
250	1.0	40/160	0.02	0.5	0.05	10	15	2N3440
325	0.1	25/250	0.03	5.0	0.03	0.8	15	MJ421
350	1.0	40/160	0.02	0.5	0.05	10	15	2N3439
PNP								
40	1.0	30/150	0.25	0.6	1.0	6.0	3.0	2N4234
40	3.0	25/180	1.0	1.5	3.0	6.0	60	2N3719
40	3.0	40/200	1.5	1.3	2.5	6.0	60	2N3867
60	1.0	30/150	0.25	0.6	1.0	6.0	3.0	2N4235
60	3.0	25/180	1.0	1.5	3.0	6.0	60	2N3720
60	3.0	30/150	1.5	1.3	2.5	6.0	60	2N3868
80	1.0	30/150	0.25	0.6	1.0	6.0	3.0	2N4236
80	3.0	30/150	1.5	0.75	1.5	6.0	60	2N6303
100	1.0	40/150	0.25	0.6	0.25	10	30	2N5679
120	1.0	40/150	0.25	0.6	0.25	10	30	2N5680

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TABLE 3 – TO-39 Case 79(1)

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Device Type
NPN								
60	3.0	30/150	1.0	0.7	2.0	6.0	40	2N5334
60	4.0	20/100	4.0	1.0	4.0	10	4.0	2N4877
80	3.0	30/150	1.0	0.7	2.0	6.0	40	2N5335
80	5.0	30/120	2.0	1.2	5.0	6.0	30	2N5336
80	5.0	60/240	2.0	1.2	5.0	6.0	30	2N5337
100	5.0	30/120	2.0	1.2	5.0	6.0	30	2N5338
100	5.0	60/240	2.0	1.2	5.0	6.0	30	2N5339
PNP								
60	5.0	25/180	2.0	1.2	5.0	10	30	MJ8100
80	5.0	25/180	2.0	1.2	5.0	10	30	MJ8101
80	5.0	30/120	2.0	0.7	2.0	10	30	2N6190
80	5.0	60/240	2.0	0.7	2.0	10	30	2N6191
100	5.0	30/120	2.0	0.7	2.0	10	30	2N6192
100	5.0	60/240	2.0	0.7	2.0	10	30	2N6193
200	1.0	20/—	0.5	1.0	0.5	5.0	40	MJ4645
300	1.0	20/—	0.5	1.2	0.5	5.0	40	MJ4646
400	1.0	20/—	0.5	1.5	0.5	5.0	30	MJ4647
350	1.0	20/—	0.5	1.5	0.5	5.0	30	MJ4648



TABLE 4 – TO-66 Case 80-02



BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Device Type
NPN								
40	1.0	20/100	0.5	0.6	1.0	25	3.0	2N4910
40	2.0	25/200	0.5	1.0	0.5	20	15	MJ3101
40	4.0	25/150	1.5	2.0	3.0	35	4.0	2N4231
55	4.0	25/100	0.5	1.0	0.5	25	4.0	2N3054
55	4.0	25/100	0.5	1.0	0.5	75	3.0	2N3054A
60	1.0	20/100	0.5	0.6	1.0	25	3.0	2N4911
	2.0	25/200	0.5	1.0	0.5	20	15	MJ2249
	3.0	40/160	0.5	2.5	1.0	20	10	2N3766
	4.0	25/150	1.5	2.0	3.0	35	4.0	2N4232
	7.0	20/100	2.5	1.0	4.0	90	4.0	2N6315
80	1.0	20/100	0.5	0.6	1.0	25	3.0	2N4912
	2.0	25/200	0.5	1.0	0.5	20	15	MJ2250
	3.0	40/160	0.5	2.5	1.0	20	10	2N3767
	4.0	25/150	1.5	2.0	3.0	35	4.0	2N4233
	7.0	20/100	2.5	1.0	4.0	90	4.0	2N6316
	7.0	30/120	2.0	1.2	7.0	40	30	2N5427
	7.0	60/240	2.0	1.2	7.0	40	30	2N5428
100	7.0	30/120	2.0	1.2	7.0	40	30	2N5429
100	7.0	60/240	2.0	1.2	7.0	40	30	2N5430
125	2.0	25/100	0.75	1.0	0.75	40	10	2N5050
140	3.0	20/80	0.5	6.0	2.7	25	0.2	2N3441
150	2.0	25/100	0.75	1.0	0.75	40	10	2N5051
200	2.0	25/100	0.75	1.0	0.75	40	10	2N5052
225	0.5	25/200	0.05	—	—	10*	10	MJ2251
	0.1	30/200	0.05	5.0	0.05	15	15	MJ3201
	0.25	50/200	0.1	2.5	0.25	15	10	2N3738
	5.0	25/125	1.0	0.5	1.0	50	20	2N6233
275	5.0	25/125	1.0	0.5	1.0	50	20	2N6234
300	0.1	30/200	0.05	5.0	0.05	15	15	MJ3202
300	0.5	25/200	0.05	—	—	10*	10	MJ2252
300	0.25	50/200	0.1	2.5	0.25	15	10	2N3739
325	0.25	30/300	0.05	5.0	0.05	6.67*	15	MJ400
325	5.0	25/125	1.0	0.5	1.0	50	20	2N6235
PNP								
40	1.0	20/100	0.5	0.6	1.0	25	3.0	2N4898
40	3.0	20/100	0.25	0.6	1.0	25	3.0	MJ3701
55	4.0	25/100	0.5	0.5	0.5	75	3.0	2N6049
60	1.0	20/100	0.5	0.6	1.0	25	3.0	2N4899
	1.0	30/100	0.25	0.6	1.0	25	4.0	2N3740
	3.0	20/100	0.25	0.6	1.0	25	3.0	MJ2253
	7.0	20/100	2.5	1.0	4.0	90	4.0	2N6317
	1.0	20/100	0.5	0.6	1.0	25	3.0	2N4900
	1.0	30/100	0.25	0.6	1.0	25	4.0	2N3741
	3.0	20/100	0.25	0.6	1.0	25	3.0	MJ2254
	70	20/100	2.5	1.0	4.0	90	4.0	2N6318
250	1.0	25/100	0.5	3.0	1.0	40	60	2N5344
300	1.0	25/100	0.5	3.0	1.0	40	60	2N5345

\* @ T<sub>C</sub> = 70°C

TABLE 5 – Case 77-03



BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case Style	Device Type
NPN									
25	5.0	45/180	2.0	0.75	2.0	15	65	1	MJE200
30	3.0	25/—	1.0	—	—	25	—	1	MJE520
30	3.0	25/—	1.0	—	—	40	—	3	MJE3520
40	1.5	40/—	0.15	0.15	0.15	2.0	—	1	MJE720
40	3.0	20/100	0.5	0.6	1.0	30	3.0	1	2N4921



TABLE 5 (continued) – Case 77-03

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> Amp	V <sub>CE(sat)</sub> @ Volts Max	I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case Style	Device Type
NPN									
40	3.0	50/250	0.1	0.3	0.5	12.5	50	1	MJE180
	4.0	40/200	0.2	0.3	0.5	15	50	1	MJE220
	4.0	40/150	0.2	0.3	0.5	15	50	1	MJE221
	4.0	40/—	1.0	—	—	40	—	1	MJE521
	4.0	40/—	1.0	—	—	40	—	3	MJE3521
60	4.0	25/100	1.5	1.4	4.0	40	2.0	1	2N5190
	4.0	25/—	1.0	0.3	0.5	15	50	1	MJE222
	1.5	40/—	0.15	0.15	0.15	20	—	1	MJE721
	3.0	20/100	0.5	0.6	1.0	30	3.0	1	2N4922
	3.0	50/250	0.1	0.3	0.5	12.5	50	1	MJE181
80	4.0	40/200	0.2	0.3	0.5	15	50	1	MJE223
	4.0	40/150	0.2	0.3	0.5	15	50	1	MJE224
	4.0	25/100	1.5	1.4	4.0	40	2.0	1	2N5191
	4.0	25/—	1.0	0.3	0.5	15	50	1	MJE225
	1.5	40/—	0.15	0.15	0.15	20	—	1	MJE722
100	3.0	20/100	0.5	0.6	1.0	30	3.0	1	2N4923
	3.0	50/250	0.1	0.3	0.5	12.5	50	1	MJE182
	4.0	20/80	1.5	1.4	4.0	40	2.0	1	2N5192
	4.0	25/—	0.2	0.3	0.5	15	40	1	MJE242
	4.0	40/120	0.2	0.3	0.5	15	40	1	MJE241
150	4.0	40/200	0.2	0.3	0.5	15	40	1	MJE240
	4.0	25/—	0.2	0.3	0.5	15	40	1	MJE244
	4.0	40/120	0.2	0.3	0.5	15	40	1	MJE243
	0.5	25/200	0.05	1.0	0.05	20.8	15	1	MJE341
	0.5	30/300	0.05	1.0	0.05	20.8	15	1	MJE344
200	0.3	40/160	0.02	0.5	0.05	15	15	1	MJE3440
	0.5	30/250	0.1	1.0	0.1	20	10	1	2N5655
	0.5	30/240	0.05	—	—	20.8	—	1	MJE340
	0.5	30/250	0.1	1.0	0.1	20	10	1	2N5656
	0.5	30/300	0.05	5.0	0.05	20.8	15	1	MJE345
350	0.3	40/160	0.02	0.5	0.05	15	15	1	MJE3439
	0.5	30/250	0.1	1.0	0.1	20	10	1	2N5657
PNP									
25	5.0	45/180	2.0	0.75	20	15	65	1	MJE210
30	3.0	25/—	1.0	—	—	25	—	1	MJE370
30	3.0	25/—	1.0	—	—	25	—	3	MJE3370
40	1.5	40/—	0.15	0.15	0.15	20	—	1	MJE710
	3.0	20/100	0.5	0.6	1.0	30	3.0	1	2N4918
	4.0	40/200	0.2	0.3	0.5	15	50	1	MJE230
	4.0	40/150	0.2	0.3	0.5	15	50	1	MJE231
	4.0	40/—	1.0	—	—	40	—	1	MJE371
60	4.0	40/—	1.0	—	—	40	—	3	MJE3371
	4.0	25/100	1.5	1.2	4.0	40	2.0	1	2N5193
	4.0	25/—	1.0	0.3	0.5	15	50	1	MJE232
	3.0	50/250	0.1	0.3	0.5	12.5	50	1	MJE170
	1.5	40/—	0.15	0.15	0.15	20	—	1	MJE711
80	3.0	20/100	0.5	0.6	1.0	30	3.0	1	2N4919
	3.0	50/250	0.1	0.3	0.5	12.5	50	1	MJE171
	4.0	40/200	0.2	0.3	0.5	15	50	1	MJE233
	4.0	40/150	0.2	0.3	0.5	15	50	1	MJE234
	4.0	25/100	1.5	1.2	4.0	40	2.0	1	2N5194
100	4.0	25/—	1.0	0.3	0.5	15	50	1	MJE235
	1.5	40/—	0.15	0.15	0.15	20	—	1	MJE712
	3.0	20/100	0.5	0.6	1.0	30	3.0	1	2N4920
	3.0	50/250	0.1	0.3	0.5	12.5	50	1	MJE172
	4.0	20/80	1.5	1.2	4.0	40	2.0	1	2N5195
150	4.0	25/—	0.2	0.3	0.5	15	40	1	MJE252
	4.0	40/120	0.2	0.3	0.5	15	40	1	MJE251
	4.0	40/200	0.2	0.3	0.5	15	40	1	MJE250
	4.0	25/—	0.2	0.3	0.5	15	40	1	MJE254
	4.0	40/120	0.2	0.3	0.5	15	40	1	MJE253





TABLE 6 — Case 90-05

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> Min/Max	@ I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Device Type
NPN								
40	5.0	20/120	2.5	0.6	2.5	75	2.0	2N5977
40	8.0	20/120	4.0	0.6	4.0	90	2.0	2N5983
40	12	20/120	6.0	0.7	6.0	100	2.0	2N5989
40	15	20/100	5.0	1.8	15	90	3.0	MJE1660
50	5.0	25/100	2.0	—	—	65	—	MJE205
60	5.0	20/120	2.5	0.6	2.5	75	2.0	2N5978
60	8.0	20/120	4.0	0.6	4.0	90	2.0	2N5984
60	10	20/70	4.0	8.0	10	90	2.0	MJE3055
60	10	25/100	3.0	—	—	90	—	MJE2801
60	15	20/100	5.0	1.8	15	90	3.0	MJE1661
60	12	20/120	6.0	0.7	6.0	100	2.0	2N5990
80	5.0	20/120	2.5	0.6	2.5	75	2.0	2N5979
80	8.0	20/120	4.0	0.6	4.0	90	2.0	2N5985
80	12	20/120	6.0	0.7	6.0	100	2.0	2N5991
PNP								
40	5.0	20/120	2.5	0.6	2.5	75	2.0	2N5974
40	8.0	20/120	4.0	0.6	4.0	90	2.0	2N5980
40	12	20/120	6.0	0.7	6.0	100	2.0	2N5986
40	15	20/100	5.0	1.8	15	90	3.0	MJE1290
50	5.0	25/100	2.0	—	—	65	—	MJE105
60	5.0	20/120	2.5	0.6	2.5	75	2.0	2N5975
60	8.0	20/120	4.0	0.6	4.0	90	2.0	2N5981
60	10	20/70	4.0	8.0	10	90	2.0	MJE2955
60	10	25/100	3.0	—	—	90	—	MJE2901
60	12	20/120	6.0	0.7	6.0	100	2.0	2N5987
60	15	20/100	5.0	1.8	15	90	3.0	MJE1291
80	5.0	20/120	2.5	0.6	2.4	75	2.0	2N5976
80	8.0	20/120	4.0	0.6	4.0	90	2.0	2N5982
80	12	20/120	6.0	0.7	6.0	100	2.0	2N5988





TABLE 7 — Case 199-04

$V_{CEO}$ Volts Max	$I_C$ Amp Max	$h_{FE}$ Min/Max	@ $I_C$ Amp	$V_{CE(sat)}$ Volts Max	@ $I_C$ Amp	$P_D$ Watts	$f_T$ MHz Min	Device Type
NPN								
30	30	25/—	1.0	—	—	40	—	MJE520K
40	3.0	20/100	0.5	0.6	1.0	40	3.0	MJE4921
40	3.0	20/100	1.0	0.6	1.0	40	3.0	MJE2522
40	3.0	40/200	0.2	0.7	1.0	40	3.0	MJE2520
40	4.0	20/100	1.5	0.7	1.5	60	2.0	MJE2480
40	4.0	20/100	2.5	0.7	1.5	60	2.0	MJE2482
40	4.0	25/100	1.5	0.6	1.5	60	2.0	MJE5190
40	4.0	40/—	1.0	—	—	60	—	MJE521K
40	5.0	20/120	2.5	0.6	2.5	75	2.0	MJE5977
40	5.0	25/125	1.0	1.0	3.5	80	3.0	MJE2020
40	8.0	20/120	4.0	0.6	4.0	90	2.0	MJE5983
50	5.0	25/100	2.0	—	—	65	—	MJE205K
55	4.0	25/100	0.5	1.0	0.5	40	—	MJE3054
60	3.0	20/100	0.5	0.6	1.0	40	3.0	MJE4922
60	3.0	20/100	1.0	0.6	1.0	40	3.0	MJE2523
60	3.0	40/200	0.2	0.7	1.0	40	3.0	MJE2521
60	4.0	20/100	1.5	0.7	1.5	60	2.0	MJE2481
60	4.0	20/100	2.5	0.7	1.5	60	2.0	MJE2483
60	4.0	25/100	1.5	0.6	1.5	60	2.0	MJE5191
60	5.0	20/100	2.5	0.6	2.5	75	2.0	MJE5978
60	5.0	25/125	1.0	1.0	3.5	80	3.0	MJE2021
60	8.0	20/120	4.0	0.6	4.0	90	2.0	MJE5984
60	10	20/70	4.0	1.1	4.0	90	2.0	MJE3055K
60	10	25/100	3.0	—	—	90	—	MJE2801K
80	3.0	20/100	0.5	0.6	1.0	40	3.0	MJE4923
80	4.0	20/80	1.5	0.6	1.5	60	2.0	MJE5192
80	5.0	20/120	2.5	0.6	2.5	75	2.0	MJE5979
80	8.0	20/120	4.0	0.6	4.0	90	2.0	MJE5985
150	0.5	25/200	0.05	1.0	0.05	30	15	MJE341K
200	0.5	30/300	0.05	1.0	0.05	30	15	MJE344K
225	0.5	40/200	0.1	2.5	0.25	30	10*	MJE3738
250	0.5	30/250	0.1	1.0	0.1	30	10	MJE5655
300	0.5	30/250	0.1	1.0	0.1	30	10	MJE5656
300	0.5	30/240	0.05	—	—	30	—	MJE340K
300	0.5	40/200	0.1	2.5	0.25	30	10*	MJE3739
300	1.5	30/240	0.5	3.5	0.5	50	—	MJE2160
350	0.5	25/200	0.05	1.5	0.1	30	10*	MJE2360
350	0.5	30/250	0.1	1.0	0.1	30	10	MJE5657
350	0.5	50/250	0.05	1.5	0.1	30	10*	MJE2361
PNP								
30	3.0	25/—	1.0	—	—	40	—	MJE370K
40	3.0	20/100	0.5	0.6	1.0	40	3.0	MJE4918
40	3.0	20/100	1.0	0.6	1.0	60	3.0	MJE2490
40	3.0	40/200	0.2	0.7	1.0	40	3.0	MJE2370
40	4.0	25/100	1.5	0.6	1.5	60	2.0	MJE5193
40	4.0	40/—	1.0	—	—	60	—	MJE371K
40	5.0	20/120	2.5	0.6	2.5	75	2.0	MJE5974
40	5.0	25/125	1.0	1.0	3.5	80	3.0	MJE2010
40	8.0	20/120	4.0	0.6	4.0	90	2.0	MJE5980
50	5.0	25/100	2.0	—	—	65	—	MJE105K
60	3.0	20/100	0.5	0.6	1.0	40	3.0	MJE4919
60	3.0	20/100	1.0	0.6	1.0	60	3.0	MJE2491
60	3.0	40/200	0.2	0.7	1.0	40	3.0	MJE2371
60	4.0	25/100	1.5	0.6	1.5	60	2.0	MJE5194
60	4.0	30/100	0.25	0.6	1.0	40	4.0	MJE3740

\*Typ



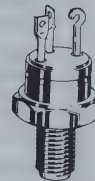
TABLE 7 (continued) — Case 199-04

$BV_{CEO}$ Volts Max	$I_C$ Amp Max	$h_{FE}$ Min/Max	@ $I_C$ Amp	$V_{CE(sat)}$ Volts Max	@ $I_C$ Amp	$P_D$ Watts	$f_T$ MHz Min	Device Type
NPN								
60	5.0	20/120	2.5	0.6	2.5	75	2.0	MJE5975
60	5.0	25/125	1.0	1.0	3.5	80	3.0	MJE2011
60	8.0	20/120	4.0	0.6	4.0	90	2.0	MJE5981
60	10	20/70	4.0	1.1	4.0	90	2.0	MJE2955K
60	10	25/100	3.0	—	—	90	—	MJE2901K
80	3.0	20/100	0.5	0.6	1.0	40	3.0	MJE4920
80	4.0	20/80	1.5	0.6	1.5	60	2.0	MJE5195
80	4.0	30/100	0.25	0.6	1.0	40	4.0	MJE3741
80	5.0	20/120	2.5	0.6	2.5	75	2.0	MJE5976
80	8.0	20/120	4.0	0.6	4.0	90	2.0	MJE5982

TABLE 8 — TO-59



Case 160

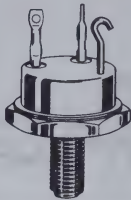


Case 160A

$BV_{CEO}$ Volts Max	$I_C$ Amp Max	$h_{FE}$ Min/Max	@ $I_C$ Amp	$V_{CE(sat)}$ Volts Max	@ $I_C$ Amp	$P_D$ Watts	$f_T$ MHz Min	Case	Device Type
NPN									
80	7.0	30/120	2.0	1.2	7.0	60	30	160	2N5346
80	7.0	30/120	2.0	1.2	7.0	60	30	160A	2N5477
80	7.0	60/240	2.0	1.2	7.0	60	30	160	2N5347
80	7.0	60/240	2.0	1.2	7.0	60	30	160A	2N5478
100	7.0	30/120	2.0	1.2	7.0	60	30	160	2N5348
100	7.0	30/120	2.0	1.2	7.0	60	30	160A	2N5479
100	7.0	60/240	2.0	1.2	7.0	60	30	160	2N5349
100	7.0	60/240	2.0	1.2	7.0	60	30	160A	2N5480
PNP									
60	7.0	25/180	2.0	0.7	2.0	60	30	160A	MJ500
60	7.0	25/180	2.0	0.7	2.0	60	30	160	MJ6700
80	7.0	25/180	2.0	0.7	2.0	60	30	160A	MJ501
80	7.0	25/180	2.0	0.7	2.0	60	30	160	MJ6701
80	10	30/120	2.0	0.7	2.0	60	30	160A	2N6182
80	10	60/240	2.0	0.7	2.0	60	30	160A	2N6183
80	10	30/120	2.0	0.7	2.0	60	30	160	2N6186
80	10	60/240	2.0	0.7	2.0	60	30	160	2N6187
100	10	30/120	2.0	0.7	2.0	60	30	160A	2N6184
100	10	60/240	2.0	0.7	2.0	60	30	160A	2N6185
100	10	30/120	2.0	0.7	2.0	60	30	160	2N6188
100	10	60/240	2.0	0.7	2.0	60	30	160	2N6189

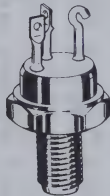


TABLE 9 – TO-61 Case 9



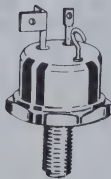
$BV_{CEO}$ Volts Max	$I_C$ Amp Max	$h_{FE}$ Min/Max	@ $I_C$ Amp	$V_{CE(sat)}$ Volts Max	@ $I_C$ Amp	$P_D$ Watts	$f_T$ MHz Min	Device Type
NPN								
40	10	30/120	2.0	0.4	2.0	25	100	2N5304
80	5.0	20/90	2.0	1.0	2.0	115	10	2N1724
80	5.0	50/150	2.0	1.0	2.0	115	10	2N1725
80	7.5	20/60	3.0	1.2	3.0	115	10	2N3487
80	7.5	40/120	5.0	1.0	3.0	115	10	2N3490
100	7.5	20/60	3.0	1.2	3.0	115	10	2N3488
100	7.5	40/120	5.0	1.0	3.0	115	10	2N3491
120	7.5	15/45	3.0	1.2	3.0	115	10	2N3489
120	7.5	30/90	5.0	1.0	3.0	115	10	2N3492

TABLE 10 – TO-63 Case 188



$BV_{CEO}$ Volts Max	$I_C$ Amp Max	$h_{FE}$ Min/Max	@ $I_C$ Amp	$V_{CE(sat)}$ Volts Max	@ $I_C$ Amp	$P_D$ Watts	$f_T$ MHz Min	Device Type
NPN								
100	30	20/100	10	1.0	10	150	30	MJ7000
100	50	30/120	20	1.2	20	250	30	2N6278
120	50	30/120	20	1.2	20	250	30	2N6279
140	50	30/120	20	1.2	20	250	30	2N6280
150	50	30/120	20	1.2	20	250	30	2N6281

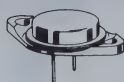
TABLE 11 – TO-114 Case 177



$BV_{CEO}$ Volts Max	$I_C$ Amp Max	$h_{FE}$ Min/Max	@ $I_C$ Amp	$V_{CE(sat)}$ Volts Max	@ $I_C$ Amp	$P_D$ Watts	$f_T$ MHz Min	Device Type
NPN								
80	60	20/100	20	1.0	20	300	20	MJ7200
100	60	20/100	20	1.0	20	300	20	MJ7201



TABLE 12  
DARLINGTON TRANSISTORS  
(Metal)



Case 11  
(TO-3)



Case 80-02  
(TO-66)



Case 253

BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub> Min/Max	I <sub>C</sub> @ Amp	V <sub>CE(sat)</sub> Volts Max	I <sub>C</sub> @ Amp	P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case	Device Type	
									NPN	PNP
40	15	500/—	4.0	2.5	4.0	150	—	11	MJ3520	—
40	20	500/5000	4.0	1.8	4.0	150	—	11	2N6355	—
40	20	1500/10000	4.0	1.8	4.0	150	—	11	2N6356	—
60	4.0	750/18000	2.0	2.0	2.0	50	4.0	253	MJ4200	MJ4210
60	4.0	750/18000	2.0	2.0	2.0	50	4.0	80-02	2N6294	2N6296
60	4.0	1000/—	1.5	2.0	1.5	75	—	11	MJ4000	MJ4010
60	8.0	750/18000	4.0	2.0	4.0	75	4.0	80-02	2N6300	2N6298
60	8.0	750/18000	4.0	2.0	4.0	100	4.0	11	2N6055	2N6053
60	8.0	750/18000	4.0	2.0	4.0	160	4.0	253	MJ1200	MJ920
60	8.0	1000/—	3.0	2.0	3.0	90	—	11	MJ1000	MJ900
60	10	1000/—	5.0	2.5	3.0	150	—	11	MJ3000	MJ2500
60	12	750/18000	6.0	2.0	6.0	150	4.0	11	2N6057	2N6050
60	16	1000/—	10	2.5	1.0	150	—	11	MJ4033	MJ4030
60	20	500/5000	4.0	1.8	4.0	150	—	11	2N6357	—
60	20	1500/1000	4.0	1.8	4.0	150	—	11	2N6358	—
60	20	750/18000	10	2.0	10	160	4.0	11	2N6282	2N6285
80	4.0	750/18000	2.0	2.0	2.0	50	4.0	253	MJ4201	MJ4211
80	4.0	750/18000	2.0	2.0	2.0	50	4.0	80-02	2N6295	2N6297
80	4.0	1000/—	1.5	2.0	1.5	75	—	11	MJ4001	MJ4011
80	8.0	750/18000	4.0	2.0	4.0	75	4.0	80-02	2N6301	2N6299
80	8.0	750/18000	4.0	2.0	4.0	100	4.0	11	2N6056	2N6054
80	8.0	750/18000	4.0	2.0	4.0	160	4.0	253	MJ1201	MJ921
80	8.0	1000/—	3.0	2.0	3.0	90	—	11	MJ1001	MJ901
80	10	1000/—	5.0	2.5	5.0	150	—	11	MJ3001	MJ2501
80	12	750/18000	6.0	2.0	6.0	150	4.0	11	2N6058	2N6051
80	15	500/—	4.0	1.8	4.0	150	—	11	MJ3521	—
80	16	1000/—	10	2.5	10	150	—	11	MJ4034	MJ4031
80	20	750/18000	10	2.0	10	160	4.0	11	2N6283	2N6286
100	12	750/18000	6.0	2.0	6.0	150	4.0	11	2N6059	2N6052
100	16	1000/—	10	2.5	10	150	—	11	MJ4035	MJ4032
100	20	750/18000	10	2.0	10	160	4.0	11	2N6284	2N6287
300	7.0	100/—	2.5	2.2	2.5	100	—	11	MJ3040	—
300	7.0	250/—	2.5	2.2	2.5	100	—	11	MJ3041	—
350	7.0	250/—	2.5	2.2	2.5	100	—	11	MJ3042	—



TABLE 13  
DARLINGTON TRANSISTORS (Plastic)

Case 199-04



Case 77-03



Case 90-05



BV <sub>CEO</sub> Volts Max	I <sub>C</sub> Amp Max	h <sub>FE</sub>		I <sub>C</sub> @ Amp	V <sub>CE(sat)</sub> Volts Max		P <sub>D</sub> Watts	f <sub>T</sub> MHz Min	Case	Device Type	
		Min/Max			Max	@ Amp				NPN	PNP
40	4.0	750/15000		2.0	2.0	2.0	1.5	25	77-03	2N6037	2N6034
60	4.0	750/-		1.5	2.5	1.5	40	-	77-03	MJE800	MJE700
60	4.0	750/-		2.0	2.8	2.0	40	-	77-03	MJE801	MJE701
60	4.0	750/15000		2.0	2.0	2.0	1.5	25	77-03	2N6038	2N6035
60	5.0	750/-		3.0	2.5	3.0	70	1.0	90-05	MJE1100	MJE1090
60	5.0	750/-		4.0	2.8	4.0	70	1.0	90-05	MJE1101	MJE1091
60	5.0	750/-		3.0	2.5	3.0	70	-	199-04	MJE2100	MJE2090
60	5.0	750/-		3.0	2.5	3.0	70	-	199-04	MJE2101	MJE2091
60	8.0	1000/20000		4.0	2.0	4.0	75	-	90-05	2N6043	2N6040
60	8.0	1000/20000		4.0	2.0	4.0	75	-	90-05	MJE6043	MJE6040
80	4.0	750/-		1.5	2.5	1.5	40	-	77-03	MJE802	MJE702
80	4.0	750/-		2.0	2.8	2.0	40	-	77-03	MJE803	MJE703
80	5.0	750/-		3.0	2.5	3.0	70	1.0	90-05	MJE1102	MJE1092
80	5.0	750/-		4.0	2.8	4.0	70	1.0	90-05	MJE1103	MJE1093
80	4.0	750/15000		2.0	2.0	2.0	1.5	25	77-03	2N6039	2N6036
80	5.0	750/-		4.0	2.8	4.0	70	-	199-04	MJE2102	MJE2092
80	5.0	750/-		4.0	2.8	4.0	70	-	199-04	MJE2103	MJE2093
80	8.0	1000/20000		4.0	2.0	4.0	75	-	90-05	2N6044	2N6041
80	8.0	1000/20000		4.0	2.0	4.0	75	-	90-05	MJE6044	MJE6041
100	8.0	1000/20000		3.0	2.0	3.0	75	-	90-05	2N6045	2N6042
100	8.0	1000/20000		3.0	2.0	3.0	75	-	90-05	MJE6045	MJE6042



# PLASTIC-ENCAPSULATED SMALL-SIGNAL TRANSISTORS

## *Plastic-Encapsulated Small-Signal Silicon Transistors for Industrial Applications*

This Selector Guide is designed to help you select the right silicon plastic transistor for your applications. A wide range of device types in two basic package configurations are listed in this Selector Guide.

**The TO-92** — is the most popular, high-volume plastic

package and will meet most of your high-performance, low-cost requirements.

**The Uniwatt Package** — is designed for applications requiring greater power dissipation than available with the TO-92 package.

Motorola plastic-encapsulated transistors offer the features that the design of industrial electronics equipment requires — reliability, performance, convenience and economy.

**RELIABILITY** has been well proven by extensive environmental and life testing, and the use of hundreds of millions of these transistors in industrial and consumer applications. Industrial plastic transistors are encapsulated by a high-temperature pressure-molded process that produces a rugged one-piece package resistant to humidity and shock. Ask us for our new brochure entitled, "Some Plain Talk About Motorola's TO-92 Plastic Transistor Reliability."

**PERFORMANCE** is assured by careful design and testing. Geometric design and diffusion profiles are optimized to excel in specified applications such as high-speed switching, high-frequency amplification, and low-noise amplification.

Ask for Motorola's new comprehensive Designer's Manual entitled, "Motorola's Low-Cost Transistor Directory."

### POWER DISSIPATION

Continuous package improvements have enhanced the power dissipation of Motorola's plastic encapsulated transistors. All devices in the nickel lead frame TO-92 package can now dissipate 350 mW in addition to the following:

$P_D @ T_A = 25^\circ\text{C} = 350 \text{ mW}$      $P_D @ T_C = 25^\circ\text{C} = 1.0 \text{ W}$

Derate above  $25^\circ\text{C} = 2.8 \text{ mW}/^\circ\text{C}$     Derate above  $25^\circ\text{C} = 8.0 \text{ mW}/^\circ\text{C}$

$\theta_{JA} = 0.125^\circ\text{C}/\text{mW}$      $\theta_{JC} = 0.357^\circ\text{C}/\text{mW}$

$T_J = -65 \text{ to } +150^\circ\text{C}$

All devices in the copper lead frame TO-92 package can now dissipate 625 mW in addition to the following:

Motorola plastic transistors are 100% performance tested on high-speed, computer-controlled equipment, before shipment, to assure conformance to specifications.

**CONVENIENCE** in use is enhanced by a number of package variations — the popular D-shaped, Unibloc package which can dissipate 350-625 mW at an ambient temperature of  $25^\circ\text{C}$ , and Uniwatt package used for applications requiring up to 10 watts dissipation.

**ECONOMY** is a prime concern of the industrial designer. Motorola's highly efficient plastic product lines are the most advanced in the industry. Devices are produced by stripline techniques on highly mechanized equipment that reduces labor costs and provides high uniformity and quality.

$P_D @ T_A = 25^\circ\text{C} = 625 \text{ mW}$      $P_D @ T_C = 25^\circ\text{C} = 1.5 \text{ W}$

Derate above  $25^\circ\text{C} = 5.0 \text{ mW}/^\circ\text{C}$     Derate above  $25^\circ\text{C} = 12 \text{ mW}/^\circ\text{C}$

$\theta_{JA} = 200^\circ\text{C}/\text{W}$      $\theta_{JC} = 83.3^\circ\text{C}/\text{W}$

$T_J = -65 \text{ to } +150^\circ\text{C}$

All devices in the Uniwatt package — Case 152 — can now dissipate 1.0 W in addition to the following:

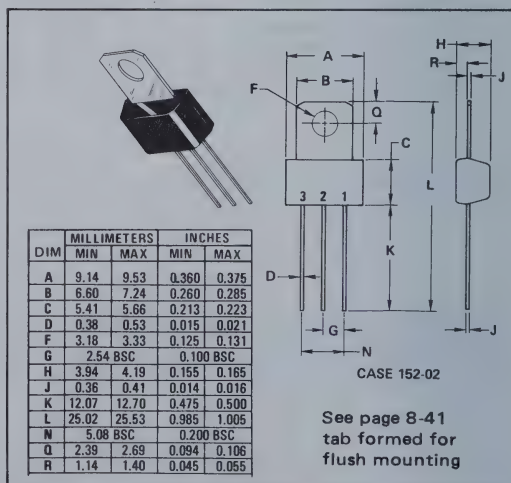
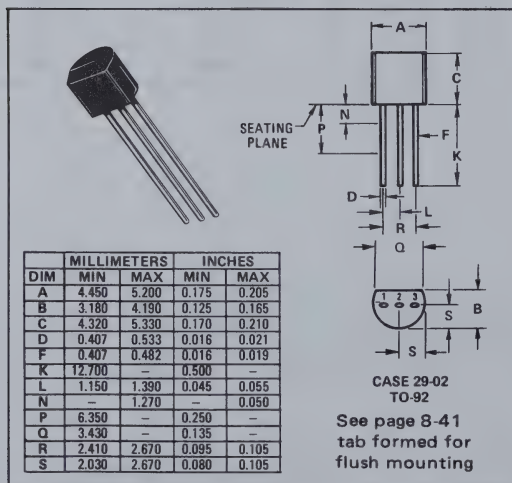
$P_D @ T_A = 25^\circ\text{C} = 1.0 \text{ W}$      $P_D @ T_C = 25^\circ\text{C} = 10 \text{ W}$

Derate above  $25^\circ\text{C} = 8.0 \text{ mW}/^\circ\text{C}$     Derate above  $25^\circ\text{C} = 80 \text{ mW}/^\circ\text{C}$

$\theta_{JA} = 125^\circ\text{C}/\text{W}$      $\theta_{JC} = 12.5^\circ\text{C}/\text{W}$

$T_J = -55 \text{ to } +150^\circ\text{C}$

### MOTOROLA PLASTIC PACKAGE OUTLINES





**PLASTIC ENCAPSULATED SMALL-SIGNAL TRANSISTORS** (continued)

**DESIGN STOCK**

The transistor requirements of most small-signal industrial circuits can be met by a limited number of versatile devices. The ten inexpensive transistors listed below can satisfy most design requirements, while minimizing the number of transistors that must be stocked.

**GENERAL-PURPOSE SWITCHES AND AMPLIFIERS**

LOW-CURRENT – TO 100 mA				HIGH CURRENT – TO 500 mA (these types generate Low Noise at Low Currents)			
	NPN	PNP			NPN	PNP	
LOW GAIN	2N3903	2N3905		LOW GAIN	2N4400	2N4402	
HIGH GAIN	2N3904	2N3906		HIGH GAIN	2N4401	2N4403	

**HIGH SPEED SATURATED SWITCHES**

	NPN
LOW GAIN	2N4264
HIGH GAIN	2N4265

**DEVICE SELECTION TABLES**

These short-form specifications of devices are intended for specific applications.

Table 1	General-Purpose Saturated Switching Transistors
Table 2	High-Speed Saturated Switching Transistors
Table 3	General-Purpose Amplifier Transistors
Table 4	Darlington Amplifier Transistors
Table 5	Low-Noise Amplifier Transistors
Table 6	High-Voltage Transistors
Table 7	Medium-Power (Uniwatt) Transistors

For complete information, send for appropriate data sheet or refer to the Semiconductor Data Library.

**INDEX TO MOTOROLA  
PLASTIC-ENCAPSULATED  
SMALL-SIGNAL TRANSISTORS**

This index includes all plastic-encapsulated small-signal transistors available from Motorola. For information on devices for which no Table Number is given, contact your nearest Motorola Sales Office.

Device	Table	Device	Table	Device	Table	Device	Table	Device	Table
2N3903	1, 3, 5	MPS5006	3	MPS3709	—	MPS6563	3	MPS-H11	3
2N3904	1, 3, 5	MPS404	1	MPS3710	—	MPS6565	3, 5	MPS-H19	3
2N3905	1, 3, 5	MPS404A	1	MPS3711	—	MPS6566	3, 5	MPS-H20	3
2N3906	1, 3, 5	MPS706	2	MPS3721	3	MPS6567	—	MPS-H24	3
2N4123	1, 3	MPS706A	2	MPS4354	—	MPS6568	—	MPS-H30	3
2N4124	1, 3	MPS708	—	MPS4355	—	MPS6568A	3	MPS-H17	—
2N4125	1, 3	MPS834	2	MPS4356	—	MPS6569	—	MPS-H31	3
2N4126	1, 3	MPS835	2	MPS5172	3	MPS6570	—	MPS-H32	3
2N4264	2							MPS-H34	3
2N4265	2	MPS918	—	MPS6507	—	MPS6571	5	MPS-H37	3
		MPS2369	2	MPS6511	3	MPS6573	3		
2N4400	1, 3	MPS2711	—	MPS6512	3	MPS6574	3	MPS-H54	3
2N4401	1, 3	MPS2712	—	MPS6513	3	MPS6575	3	MPS-H55	3
2N4402	1, 3	MPS2713	—	MPS6514	3	MPS6576	3	MPS-H81	3
2N4403	1, 3	MPS2714	—	MPS6515	3	MPS6590	3	MPS-H83	3
2N4409	6	MPS2923	—	MPS6516	3	MPS6591	3	MPS-H85	6
2N4410	6	MPS2924	—	MPS6517	3	MPS-A05	3	MPS-L01	6
2N5086	3, 5	MPS2925	—	MPS6518	3	MPS-A06	3	MPS-L51	7
2N5087	3, 5	MPS2926	—	MPS6519	3	MPS-A09	3, 5	MPS-U01	7
2N5088	3, 5					MPS-A12	4	MPS-U01A	7
2N5089	3, 5	MPS3390	—	MPS6520	5	MPS-A13	4	MPS-U02	7
		MPS3391	—	MPS6521	5	MPS-A14	4		
2N5208	—	MPS3391A	—	MPS6522	5	MPS-A16	3	MPS-U03	7
2N5209	3, 5	MPS3392	—	MPS6523	5	MPS-A17	3	MPS-U04	7
2N5210	3, 5	MPS3393	—	MPS6530	3	MPS-A18	5	MPS-U05	7
2N5219	—	MPS3394	—	MPS6531	3	MPS-A20	3	MPS-U06	7
2N5220	—	MPS3395	—	MPS6532	3			MPS-U07	7
2N5221	—	MPS3563	—	MPS6533	3	MPS-A42	6	MPS-U10	7
2N5222	—	MPS3638	1, 3	MPS6534	3	MPS-A43	6	MPS-U45	7
2N5223	—	MPS3638A	1, 3	MPS6535	3	MPS-A55	3	MPS-U51	7
2N5224	—					MPS-A56	3	MPS-U51A	7
2N5225	—	MPS3639	2	MPS6539	—	MPS-A65	4	MPS-U52	7
		MPS3640	2	MPS6540	—	MPS-A66	4	MPS-U55	7
2N5226	—	MPS3646	2	MPS6542	—	MPS-A70	3	MPS-U56	7
2N5227	—	MPS3693	3	MPS6543	—	MPS-A92	6	MPS-U57	7
2N5228	—	MPS3694	3	MPS6544	—	MPS-A93	6	MPS-U60	7
2N5400	6	MPS3702	—	MPS6545	—	MPS-H02	3		
2N5401	6	MPS3703	—	MPS6546	—			MPS-U95	
2N5550	6	MPS3704	—	MPS6547	—	MPS-H04	3		
2N5551	6	MPS3705	—	MPS6548	—	MPS-H05	3		
2N5845	1	MPS3706	—	MPS6560	3	MPS-H07	3		
2N5845A	—	MPS3707	—	MPS6561	3	MPS-H08	3		
2N6067	—	MPS3708	—	MPS6562	3	MPS-H10	3		



PLASTIC ENCAPSULATED SMALL-SIGNAL TRANSISTORS/(continued)

TABLE 1  
GENERAL-PURPOSE  
SATURATED  
SWITCHING TRANSISTORS

The transistors in this table are characterized for general medium-voltage, medium-speed switching applications. These transistors also may be used as general-purpose amplifiers. All have base-emitter voltages of 4 to 6 volts, output capacitances of 4 to 20 pF, and power dissipation ratings of 350 mW. The devices are listed in order of decreasing breakdown voltage ( $V_{CEO}$ ), then in order of decreasing collector test current ( $I_C$ ).

BV <sub>CEO</sub> Volts	Collector Test Current	h <sub>FE</sub> Min	V <sub>CE(sat)</sub> @ I <sub>C</sub>		f <sub>T</sub> @ I <sub>C</sub>		Switching Times @ I <sub>C</sub> /I <sub>B</sub>			Device Type	Complement
	for h <sub>FE</sub> I <sub>C</sub> in mA		Volts Max	mA	MHz Min	mA	ns Max		mA		
							t <sub>ON</sub>	t <sub>OFF</sub>			
NPN											
40	500	25	0.6	500	200	50	40	60	500/50	2N5845**	2N4403 2N4402 2N3906 2N3905
40	500	35	0.5	500	250	50	30	50	500/50	2N5845A**	
40	150	100	0.75	500	250	20	35	255	150/15	2N4401	
40	150	50	0.75	500	200	20	35	255	150/15	2N4400	
40	10	100	0.3	50	300	10	70	250	10/1.0	2N3904	
40	10	50	0.3	50	250	10	70	225	10/1.0	2N3903	
30	2.0	50	0.3	50	250	10	37*	136*	10/1.0	2N4123	2N4125
25	2.0	120	0.3	50	300	10	37*	136*	10/1.0	2N4124	2N4126
PNP											
40	150	100	0.75	500	200	20	35	255	150/15	2N4403	2N3903
40	150	50	0.75	500	150	20	35	255	150/15	2N4402	2N4400
40	100	50	0.3	100	150	50	40	80	500/50	2N6067	
40	10	100	0.4	50	250	10	70	300	10/1.0	2N3906	2N3904
40	10	50	0.4	50	200	10	70	260	10/1.0	2N3905	2N3903
35	12	30	0.2	24	—	—	265	385	10/1.0	MPS404A‡	
30	2.0	50	0.4	50	200	10	43*	155*	10/1.0	2N4125	2N4123
25	50	100	2.0	300	150	50	90	210	300/30	MPS3638A	
25	50	30	1.0	300	100	50	90	210	300/30	MPS3638	
25	2.0	120	0.4	50	250	10	43*	155*	10/1.0	2N4126	2N4124
24	12	30	0.2	24	—	—	265	385	10/1.0	MPS404†	

\*Typical    †V<sub>EB</sub> = 12 Vdc    ‡V<sub>EB</sub> = 24 Vdc    \*\*P<sub>D</sub> = 625 mW @ T<sub>A</sub> = 25°C

TABLE 2  
HIGH-SPEED  
SATURATED  
SWITCHING TRANSISTORS

The transistors listed in this table are optimized for high-speed saturated switching. They are heavily gold doped and otherwise processed to provide very short storage times and low capacitance. (Output capacitances below 6 pF). The power dissipation is rated at 350 mW. The transistors are listed in order of decreasing breakdown voltage ( $V_{CEO}$ ), then in order of decreasing collector test current ( $I_C$ ).

BV <sub>CEO</sub> Volts	Collector Test Current for h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min	V <sub>CE(sat)</sub> @ I <sub>C</sub>		f <sub>T</sub> @ I <sub>C</sub>		Switching Times @ I <sub>C</sub> /I <sub>B</sub>			Device Type
			Volts Max	mA	MHz Min	mA	ns Max		mA	
							t <sub>on</sub>	t <sub>off</sub>		
NPN										
30	10	25	0.25	10	350	10	16	30	10/3.0	MPS834
20	10	20	0.3	10	300	10	20	35	10/3.0	MPS835
15	30	40	0.35	100	300	10	23	35	100/10	2N4264
15	30	30	0.5	300	350	30	25	35	300/30	MPS3646
15	10	40	0.25	10	—	—	12	18	10/3.0	MPS2369
15	10	20	0.6	10	200	10	40	75	10/—	MPS706,A
12	10	100	0.35	100	300	10	23	35	100/10	2N4265
PNP										
12	10	30	0.2	10	500	10	40	32	50/5.0	MPS3640
6.0	10	30	0.16	10	500	10	40	32	50/5.0	MPS3639



PLASTIC ENCAPSULATED SMALL-SIGNAL TRANSISTORS (continued)

TABLE 3  
 GENERAL-PURPOSE  
 AMPLIFIER TRANSISTORS

These general-purpose transistors are designed for small-signal amplification from dc to low radio frequencies. They are also useful as oscillators and general-purpose switches. The transistors are listed in order of decreasing breakdown voltage ( $V_{CE0}$ ), then in order of decreasing collector test current ( $I_C$ ).  $P_D = 350\text{ mW}$  at  $T_A = 25^\circ\text{C}$  unless otherwise specified.

BV <sub>CEO</sub> Volts	Collector Test Current for h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min/Max	f <sub>T</sub> @ I <sub>C</sub>		Device Type	Complement
			MHz Min	mA		
NPN						
80	10	50/—	50	100	MPS-A06*	MPS-A56
80	10	40/—	60	10	MPS6590	
80	1.5	30/150	80	1.5	MPS-H05	MPS-H55
80	1.5	30/120	80	1.5	MPS-H04	MPS-H54
60	10	50/—	50	100	MPS-A05*	MPS-A55
50	1.0	250/—	30	0.5	2N5210	2N5087
50	1.0	150/—	30	0.5	2N5209	2N5086
50	10	40/—	60	10	MPS6591	
50	0.1	100/600	30	0.5	MPS-A09	
45	20	15/—	500	15	MPS-H34*	
45	10	200/500	200	10	MPS6575	
45	10	100/400	200	10	MPS6566	
45	10	40/160	200	10	MPS6565	
45	7.0	40/—	500	15	MPS-H34	
45	1.0	100/300	200	10	MPS6576	
40	150	100/300	200	20	2N4400	2N4402
40	150	50/150	250	20	2N4401	2N4403
40	100	90/270	390†	50	MPS6531	MPS6534
40	100	40/120	390†	50	MPS6530	MPS6533
40	10	100/300	300	10	2N3904	2N3906
40	10	50/150	250	10	2N3903	2N3905
40	5.0	200/600	100	5.0	MPS-A16	
40	5.0	200/600	80	5.0	MPS-A17	
40	5.0	40/400	125	5.0	MPS-A20	
40	5.0	25/—	300	5.0	MPS-H37	
40	4.0	30/—	400	4.0	MPM5006	
35	10	200/500	200	10	MPS6573	
35	1.0	100/300	200	10	MPS6574	
30	100	30/—	390†	50	MPS6532	MPS6535
30	8.0	30/—	400	8.0	MPS-H24*	
30	4.0	25/—	400	4.0	MPS-H20	
30	4.0	27/200	300	4.0	MPS-H32*	
30	3.0	20/—	400	3.0	MPS-H07*	
30	3.0	20/—	500	3.0	MPS-H08*	
30	2.0	90/180	250†	2.0	MPS6513	MPS6517
30	2.0	50/150	250	10	2N4123	2N4125
30	2.0	50/100	250†	2.0	MPS6512	MPS6516
30	1.0	350/—	50	0.5	2N5088	
25	10	100/500	120†	2.0	MPS5172	
25	4.0	60/—	650	4.0	MPS-H10	
25	4.0	60/—	650	4.0	MPS-H11	
25	4.0	45/—	300	4.0	MPS-H19	
25	2.0	250/500	390†	2.0	MPS6515	MPS6519
25	2.0	150/300	390†	2.0	MPS6514	MPS6518
25	2.0	120/360	300	10	2N4124	2N4126
25	1.0	450/—	50	0.5	2N5089	
20	500	50/200	60	10	MPS6560*	MPS6562
20	350	50/200	60	10	MPS6561*	MPS6563
20	4.0	20/200	375	4.0	MPS6568	
20	4.0	20/200	375	4.0	MPS6568A	
20	4.0	20/200	375	4.0	MPS-H02*	
20	4.0	20/200	300	4.0	MPS-H30	
20	4.0	20/200	300	4.0	MPS-H31	
18	2.0	60/660‡			MPS3721	

† typical      ‡  $h_{FE}$  @  $f = 1.0\text{ kHz}$       \*  $P_D = 625\text{ mW}$  @  $T_A = 25^\circ\text{C}$



# PLASTIC ENCAPSULATED SMALL-SIGNAL TRANSISTORS (continued)

TABLE 3 (continued)

## GENERAL-PURPOSE AMPLIFIER TRANSISTORS

BV <sub>CEO</sub> Volts	Collector Test Current for h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min/Max	f <sub>T</sub> @ I <sub>C</sub>		Device Type	Complement
			MHz Min	mA		
PNP						
80	10	50/250	100	50	MPS4356	
80	10	50/—	50	100	MPS-A56*	MPS-A06
80	1.5	30/120	80	1.5	MPS-H54	MPS-H04
80	1.5	30/150	80	1.5	MPS-H55	MPS-H05
60	10	100/400	100	50	MPS4355	
60	10	50/500	100	50	MPS4354	
60	10	50/—	50	100	MPS-A55*	MPS-A05
50	1.0	250/—	40	0.5	2N5087	2N5210
50	1.0	150/—	40	0.5	2N5086	2N5209
40	150	100/300	200	20	2N4403	2N4401
40	150	50/150	150	20	2N4402	2N4400
40	100	90/270	260†	50	MPS6534	MPS6531
40	100	40/120	250†	50	MPS6533	MPS6530
40	10	100/300	250	10	2N3906	2N3904
40	10	50/150	200	10	2N3905	2N3903
40	5.0	40/400	125	5.0	MPS-A70	
40	2.0	150/300	340†	2.0	MPS6518	MPS6514
40	2.0	90/180	200†	2.0	MPS6517	MPS6513
40	2.0	50/100	200†	2.0	MPS6516	MPS6512
30	100	30/—	260†	50	MPS6535	MPS6532
30	2.5	201/—	350	2.5	MPS-H85	
30	2.5	20/—	600	2.5	MPS-H83*	
30	2.0	50/150	200	10	2N4125	2N4123
25	50	100/—	150	50	MPS3638A	
25	50	30/—	100	50	MPS3638	
25	2.0	250/500	340†	2.0	MPS6519	MPS6515
25	2.0	120/360	250	10	2N4126	2N4124
20	500	50/200	60	10	MPS6562*	MPS6560
20	350	50/200	60	10	MPS6463*	MPS6561
20		60/—	600	5.0	MPS-H81	

† typical      ‡ h<sub>FE</sub> @ f = 1.0 kHz

\*P<sub>D</sub> = 625 mW @ T<sub>A</sub> = 25°C



TABLE 4  
DARLINGTON  
AMPLIFIER TRANSISTORS

Darlington amplifiers are compound-connected transistors that provide extremely high current gain and input impedance. Power dissipation is rated at 625 mW. These devices are listed in order of decreasing breakdown voltage ( $BV_{CEO}$ ), then in order of decreasing collector test current ( $I_C$ ).

BV <sub>CES</sub> Volts	Collector Test Current for h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min	f <sub>T</sub> @ I <sub>C</sub>	Device Type	
			MHz Min		mA
NPN					
30	10	10,000	125	10	MPS-A 14
30	10	5,000	125	10	MPS-A 13
20	10	20,000			MPS-A 12
PNP					
30	10	75,000	100	10	MPS-A 66
30	10	50,000	100	10	MPS-A 65

TABLE 5  
LOW-NOISE  
AMPLIFIER TRANSISTORS

The small-signal transistors listed in this table are characterized for low-noise amplification at low frequencies. The power dissipation is rated at 350 mW. The transistors are listed in order of decreasing breakdown voltage ( $BV_{CEO}$ ), then in order of decreasing collector test current ( $I_C$ ).

BV <sub>CEO</sub> Volts	Collector Test Current for h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min/Max	Noise Figure @ I <sub>C</sub> @ f			f <sub>T</sub> @ I <sub>C</sub>		Device Type
			NF dB Max	μA	Hz	MHz Min	mA	
NPN								
50	0.1	200/600	3.0	20	1.0 kHz	30	0.5	2N5210
50	0.1	100/300	4.0	20	1.0 kHz	30	0.5	2N5209
50	0.1	100/600	1.4*	100	1.0 kHz	30	0.5	MPS-A09
45	1.0	800/—	1.5	100	10 Hz-15.7 kHz	100	1.0	MPS-A18
45	10	100/400	4.0*	100	10 Hz-15.7 kHz	100	10	MPS6566
45	10	40/160	4.0*	100	10 Hz-15.7 kHz	40	10	MPS6565
40	0.1	40/—	5.0	100	10 Hz-15.7 kHz	300	10	2N3904
40	0.1	20/—	6.0	100	10 Hz-15.7 kHz	300	10	2N3903
30	0.1	300/900	3.0	100	10 Hz-15.7 kHz	50	0.5	2N5088
25	0.1	400/1200	2.0	100	10 Hz-15.7 kHz	50	0.5	2N5089
25	0.1	150/—	3.0	10	10 Hz-10 kHz	480*	10	MPS6521
25	0.1	100/—	3.0	10	10 Hz-10 kHz	480*	10	MPS6520
20	0.1	250/1000	1.2*	100	100 Hz	50	0.5	MPS6571
15	5.0	25/250	6.0	500	200 MHz	800	5.0	MPS-A17
PNP								
50	0.1	250/800	2.0	20	10 Hz-15.7 kHz	40	0.5	2N5087
50	0.1	150/500	3.0	20	10 Hz-15.7 kHz	40	0.5	2N5086
40	0.1	60/—	4.0	100	10-Hz-15.7 kHz	250	10	2N3906
40	0.1	30/—	5.0	100	10 Hz-15.7 kHz	200	10	2N3905
25	0.1	150/—	3.0	10	10 Hz-15.7 kHz	420*	10	MPS6523
25	0.1	100/—	3.0	10	10 Hz-15.7 kHz	420*	10	MPS6522

\*Typical



# PLASTIC ENCAPSULATED SMALL-SIGNAL TRANSISTORS (continued)

TABLE 6  
HIGH-VOLTAGE  
TRANSISTORS

These high-voltage transistors are designed for driving neon bulbs and Nixie® indicator tubes, for direct line operation, and for other applications requiring high-voltage capability at relatively low collector current. See Table 7—Medium-Power (UniWatt) Transistors also. Power Dissipation is rated at 350 mW. These devices are listed in order of decreasing breakdown voltage ( $V_{CEO}$ ), then in order of decreasing collector test current ( $I_C$ ).

BV <sub>CEO</sub> Volts	Collector Test Current for h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min/Max	V <sub>CE(sat)</sub> @ I <sub>C</sub>		f <sub>T</sub> @ I <sub>C</sub>		Device Type
			Volts Max	mA	MHz Min/Max	mA	
NPN							
300	10	40/—	0.5	20	50/—	10	MPS-A42
200	10	40/—	0.4	20	50/—	10	MPS-A43
160	10	80/250	0.15	10	100/300	10	2N5551
140	10	60/250	0.15	10	100/300	10	2N5550
120	10	50/300	0.2	10	60/—	10	MPS-L01
80	1.0	60/400	0.2	1.0	60/300	10	2N4410
50	1.0	60/400	0.2	1.0	60/300	10	2N4409
PNP							
300	10	40/—	0.5	20	50/—	10	MPS-A92
200	10	40/—	0.4	20	50/—	10	MPS-A93
150	10	60/240	0.2	10	150/300	10	2N5401
120	10	40/180	0.2	10	100/400	10	2N5400
100	50	40/250	0.25	10	60/—	10	MPS-L51

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TABLE 7  
MEDIUM-POWER  
(UNIWATT)  
TRANSISTORS

For applications requiring higher power dissipation than that of the standard Uni-bloc package, Motorola has developed the UniWatt case. In this plastic-encapsulated package, which is slightly larger than the small-signal case, the collector is mounted on a metal tab that extends out of the plastic. The tab can be attached to a heat sink to conduct heat away from the junction. With a satisfactory sink, UniWatt transistors can dissipate 5 to 8 watts. Without a heat sink, power dissipation at an ambient temperature of 25°C is 1 watt. The transistors are listed in order of decreasing collector test power current ( $I_C$ ).

$V_{CEO}$ Volts	Collector Test Current for $h_{FE}$ $I_C$ in mA	$h_{FE}$ Min/Max	$V_{CE(sat)}$ @ $I_C$ Volts Max	$I_C$ mA	$f_T$ @ $I_C$ MHz Min	$I_C$ mA	$P_D$ Watts $T_C = 25^\circ C$	Device Type	Complement	Comments
NPN										
300	10	40/—	0.75	30	60	10	1.0*	MPS-U10	MPS-U60	High-Voltage Amplifier
180	10	40/—	0.5	200	100	50	5.0	MPS-U04		High-Voltage Amplifier
120	10	40/—	0.5	200	100	50	5.0	MPS-U03		High-Voltage Amplifier
100	250	30/—	0.4	250	50	200	10	MPS-U07	MPS-U57	High-Voltage Amplifier
80	250	100/—	0.6	250	50	250	5.0	MPS-U06	MPS-U56	General Purpose
60	250	100/—	0.6	250	50	250	5.0	MPS-U05		General Purpose
40	200	25k/150k	1.5	1000	1000	200	10	MPS-U45	MPS-U95	Darlington
40	150	50/300	0.4	150	150	20	6.0	MPS-U02		General Purpose
40	100	60/—	0.5	1000	50	50	8.0	MPS-U01A	MPS-U51A	Audio Transistor
30	100	60/—	0.5	1000	50	50	8.0	MPS-U01	MPS-U51	Audio Transistor
PNP										
300	10	30/—	0.75	20	60	10	10	MPS-U60	MPS-U10	High-Voltage Amplifier
100	250	30/—	0.5	250	50	200	10	MPS-U57	MPS-U07	High-Voltage Amplifier
80	250	100/—	0.6	250	50	250	5.0	MPS-U56	MPS-U06	General Purpose
60	250	100/—	0.6	250	50	250	5.0	MPS-U55	MPS-U05	General Purpose
40	200	25k/150k	1.5	1000	50	200	10	MPS-U95	MPS-U45	Darlington
40	150	50/300	0.4	150	150	20	6.0	MPS-U52	MPS-U02	General Purpose
40	100	60/—	0.7	1000	50	50	8.0	MPS-U51A	MPS-U01A	Audio Transistor
30	100	60/—	0.7	1000	50	50	8.0	MPS-U51	MPS-U01	Audio Transistor



# SMALL-SIGNAL HERMETIC TRANSISTORS

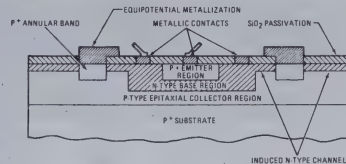
This Selector Guide covers Motorola's broad line of silicon annular and germanium mesa hermetic transistors. It includes over 500 proven transistors suitable for all low-level switching and amplifying applications: transistors with PNP and NPN polarities, breakdown voltages to 400 V, capacitances below 3.0 pF, and collector current ratings to 3.0 amperes. For maximum convenience, transistors are available in all popular metal cases, and in ceramic and metal packages containing two and four transistors. Many of the transistors are high-reliability devices that meet the requirements of military and aerospace specifications.

## SILICON ANNULAR TRANSISTORS

Motorola small-signal silicon transistors have demonstrated exceptional long-term stability and reliability in the life test laboratory and in thousands of applications. Their reliability is well demonstrated by the extensive listings of JAN and JAN TX parts in this guide.

The variety, excellent characteristics and stability of Motorola transistors are made possible by such developments as Motorola's Annular process, which produces an annular band around the active geometry of the transistor to eliminate channeling in the bulk material of the semiconductor material. This results in very low leakage and high reliability. Motorola's Field Relief Electrode (Equipotential Ring), stabilizes the surface of the transistor, and Motorola's Epitaxial Structure permits ultra-high speed devices and low collector resistance. In addition, the geometries of Motorola transistors are designed to provide optimum characteristics for the use intended.

CROSS SECTION OF  
AN ANNULAR TRANSISTOR STRUCTURE



Germanium mesa small-signal transistors are a step forward in reliability. Bonding the transistor die directly to the header provides unparalleled mechanical strength not available in alloy or grown junction type devices. Improved stability and lower leakage currents are also important advantages of this unique method of fabricating germanium rf amplifier and switching transistors.

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### SELECTOR TABLES


- 1 Silicon Amplifiers (600mW-1W)
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- 3 Silicon Switching Transistors
- 4 Chopper Transistors
- 5 Low-Noise Transistors
- 6 Darlington Amplifiers
- 7 Silicon Dual Transistors
- 8 Quad Transistors (Flat Pack)
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- 11 Avalanche Transistor
- 12 Germanium Mesa RF Amplifiers
- 13 Germanium Mesa Switches




SMALL-SIGNAL HERMETIC TRANSISTORS (continued)

TABLE 1 -- SILICON AMPLIFIER TRANSISTORS  
(600 mW to 1.0 W)

	LOW CURRENT			MEDIUM CURRENT			HIGH CURRENT		
	Normal Operation -- $\mu$ A Range			Normal Operation -- Low mA Range			Normal Operation -- Mid mA Range		
	BV <sub>CEO</sub>			BV <sub>CEO</sub>			BV <sub>CEO</sub>		
	300 V	200 V	100 V	80 V	50 V	20 V	150 V	100 V	50 V
100 //	NPN		2N3712	2N3019 • MM3019	2N1711 2N2219A** 2N2192,A,B	2N1420 2N1890 2N1983 2N2219** 2N2959 2N3300	2N3501**	2N3499**	
				• 2N4405 MM4010	2N2905A** MM4009	2N2905** 2N3134 MM4008	2N3637**	2N3635**	
50 //	NPN	2N3742	2N4926 2N4927 MM3002 MM3003	• MM3008 • MM3009	2N2297 2N3020 2N3036 • MM3020	2N667 2N699 2N1613* 2N2102 2N2193,A,B 2N2218A** 2N2224 2N3053 • MM2193A • MM3053	2N697 2N1984 2N2218** 2N2270 2N2789 2N2958 2N3110 2N3299 • MM2270	2N3500** 2N4925 MM2258 MM2260	2N3498** 2N4924 • MM3007
		• 2N3743**	• 2N4930** • 2N4931** • MM4003	• MM4002	2N3495 • 2N4404	2N2904A** 2N3494 • MM4036	2N1132* 2N1132A 2N2303 2N2801 2N2904** 2N3133 2N3671 • 2N4890 • MM4037	2N3636**	2N3634** • MM4007 • MM4031 • MM5007
20 //	NPN				2N1990 2N2194,A,B 2N2941	2N696 2N2194,A,B 2N2195,A,B 2N2217 2N2788 2N3295	2N3114 MM2259 MM3000 MM3001		2N657 2N1893 2N1990 2N2405 • MM1893
				2N4928 MM4000	2N3072 2N3081	2N1131* 2N1131A 2N1991 2N2800 2N2927 2N3120		• 2N4929** MM4001	• 2N4406 2N5865 • MM4005 • MM4032



TO-5



• TO-39


\*Motorola approved to supply JAN product  
\*\*Motorola approved to supply JAN & JANTX product  
Bold Face indicates Motorola preferred types - chosen using performance and cost as criteria.




SMALL-SIGNAL HERMETIC TRANSISTORS (continued)

TABLE 2 – SILICON AMPLIFIER TRANSISTORS  
(360 mW to 600 mW)


	LOW CURRENT			MEDIUM CURRENT			HIGH CURRENT		
	NORMAL OPERATION – $\mu$ A RANGE			NORMAL OPERATION – LOW mA RANGE			NORMAL OPERATION – MID mA RANGE		
	BV <sub>CEO</sub>			BV <sub>CEO</sub>			BV <sub>CEO</sub>		
	90 V	60 V	45 V	60 V	40 V	25 V	80 V	60 V	45 V
100 ≈ NPN		2N2484 L.N. MM2484 L.N.	2N930** L.N. 2N930A L.N.		2N843 2N956 2N2222A** 2N3303 2N3947 □ 2N5582** * MM3904	2N2222** 2N2792 2N3116			
50 ≈ NPN		2N3798A L.N. 2N3799A L.N.	2N3798 L.N. 2N3799 L.N.	2N4359	2N2907A** 2N3251A** □ 2N3486A** □ 2N3672	2N2907** 2N3136 2N3251** □ 2N3486 * MM3906			
25 ≈ NPN		2N2483	2N929** 2N929A		2N707A 2N915 2N2221A** 2N3946 □ 2N5581** * MM3903	2N707 2N718 2N731 2N916* 2N2221** 2N2791 2N3115 2N3298 2N3301	2N720A 2N740 2N2896	2N718A** 2N736 2N910 2N911 2N2895	2N841 2N2897
NPN			2N918** 2N917 2N2708 JAN		2N2331 2N2952	2N717 2N2220 2N2790 2N3544 MM1941	2N739	2N735	2N840
PNP			2N3307 2N3308	2N3073 2N3121	2N722 2N2837	2N726 2N869 2N978			




□ TO-46



TO-18



■ TO-72



\* TO-52


\* Motorola Approved to Supply JAN Product  
\*\* Motorola Approved to Supply JAN & JAN TX Product  
Bold Face Indicates Motorola Preferred Types – Chosen using Performance and Cost as Criteria  
L.N. Recommended for Low Noise Applications




# SMALL-SIGNAL HERMETIC TRANSISTORS (continued)

TABLE 3 — SILICON SWITCHING TRANSISTORS


	LOW CURRENT Specified Switching I <sub>C</sub> 5 mA – 100 mA			MEDIUM CURRENT Specified Switching I <sub>C</sub> 100 mA – 500 mA			HIGH CURRENT Specified Switching I <sub>C</sub> 400 mA – 1.5 A		
	BV <sub>CEO</sub>			BV <sub>CEO</sub>			BV <sub>CEO</sub>		
	20 V	15 V	10 V	50 V	40 V	30 V	50 V	40 V	30 V
50 ns V	2N702 2N703* 2N834 □ 2N2206 □ 2N2319 2N2501 2N2710 2N3227 □ 2N3508 □ 2N3509	2N708** 2N2368 2N2369 2N2369A** 2N3211 * 2N3511 □ 2N3648	2N743 2N744 2N2256 2N2257 2N3010 2N3011 * 2N3510 □ 2N3647 * MM1748 * MM1748A	• 2N3725		2N914** * 2N3009 * 2N3013* * 2N3014 * 2N3724	• MM3737		□ 2N3303 • MM3736
	NPN	PNP							
		MM4208A MM4209A  Non Saturated Applications • 2N4260 • 2N4261 • MM4261H	MM4208 MM4209						
	2N753 2N835	2N706* 2N706A 2N706B 2N2242 2N2481** □ MM1744B	2N705 □ 2N1708		□ 2N1959 • 2N5859 • 2N5860	□ 2N2476 □ 2N2477 □ 2N2537 □ 2N2538 2N2539 2N2540 2N2845 □ 2N2846 2N2847 □ 2N2848 2N3210 □ 2N3512	□ 2N3444* □ 2N3507** • 2N3735 □ 2N3737 • 2N5861	□ 2N2410 □ 2N3253* □ 2N3506**	□ 2N3015 □ 2N3252 • 2N3734 □ 2N3736
	NPN	PNP							
	2N3209 MM869B	2N869A**	2N2894 2N3304 2N3546 MM2894A	□ 2N2904A** □ 2N2905A** 2N2906A** 2N2907A** □ 2N3485A** □ 2N3486A**	□ 2N2904** □ 2N2905** 2N2906** 2N2907** □ 2N3485 □ 2N3486	2N3248 2N3249	□ 2N3468* □ 2N3763** □ 2N3765** □ MM3726	□ 2N3467* □ 2N3762 □ 2N3764	
	• MM3903 • MM3904				□ 2N2218A** □ 2N2219A** 2N2221A** 2N2222A** □ 2N5581** □ 2N5582**	□ 2N3299 2N3300 2N3301 2N3302			
	NPN	PNP							
	□ 2N2800 □ 2N2801 2N2837 2N2838 2N3260A** 2N3251A** • MM3905 • MM3906				• 2N4890	□ 2N3133 □ 2N3134 2N3136 2N3136	□ 2N3245 • 2N4404 • 2N4405 • 2N4406 • 2N4407	□ 2N3244	
	NPN	PNP							
1.0 μs s				(100 V) □ 2N3498** □ 2N3499** (150 V) □ 2N3500** □ 2N3501**		□ 2N2958 □ 2N2959 2N3115 2N3116			
	NPN	PNP							
	(80 V) □ 2N3494 (120 V) □ 2N3495 (80 V) 2N3496 (120 V) 2N3497 (140 V) □ 2N3634** (175 V) □ 2N3635** (140 V) □ 2N3636** (175 V) □ 2N3637**			• MM4036	• MM4037		□ MM4026 □ MM4027 □ MM4028 □ MM4029 • MM4030 • MM4031 • MM4032 • MM4033		




TO-46




TO-18




TO-5



TO-39



TO-72



TO-52

\* Motorola approved to supply JAN product

\*\* Motorola approved to supply JAN & JANTX Product

Bold Face indicates Motorola preferred types — chosen using performance and cost as the criteria.







TO-5  
Case 31 (1)



TO-18  
Case 22 (1)



TO-46  
Case 26



TO-72  
Case 20 (10)



TO-12  
Case 34A

TABLE 4 – CHOPPER TRANSISTORS

Transistors designed for chopper applications have low offset currents, low “on” voltage, high “off” resistance, and fast switching times. These devices are listed first in decreasing order of breakdown voltage ( $BV_{CEO}$ ), then in order of decreasing maximum collector current ( $I_C$  max) and dc current gain ( $h_{FE}$ ).

$BV_{CEO}$ Volts Min	$I_C$ mA Max	$h_{FE}$ Min	$BVEBO$ Volts Min	$h_{FE}$ (Inv)	$V_{EC(off)}$ mVdc Max	$f_T$ MHz Typ	$r_{ec(on)}$ Ohms Max	Package	Device Type
NPN									
20	500	50	7.0	—	3.0	250	—	TO-5	2N2330
20	500	50	7.0	—	3.0	250	—	TO-18	2N2331
PNP									
35	100	30	40	3.0	0.8	14	45	TO-46	2N2946
30	500	20	30	3.0	2.0	12*	2.0	TO-46	MM4052
30	100	50	50	15	0.8	14	10	TO-46	2N5231
20	100	50	30	15	0.5	14	8.0	TO-46	2N5230
20	100	40	25	4.0	0.5	14	35	TO-46	2N2945
10	100	80	15	6.0	0.3	16	20	TO-46	2N2944
10	100	50	15	15	0.5	14	6.0	TO-46	2N5229

\* Min

TABLE 5 – LOW-NOISE AMPLIFIER TRANSISTORS

These transistors are characterized for low-noise amplification at low frequencies. The transistors are listed first in order of decreasing breakdown voltage ( $BV_{CEO}$ ), then in order of decreasing maximum collector current ( $I_C$  max) and dc current gain ( $h_{FE}$ ).

$BV_{CEO}$ Volts Min	$I_C$ mA Max	$h_{FE}$ @ $I_C$ Min/Max	$C_{ob}$ pF Max	NF dB Max	$f_T$ MHz Typ	Package	Device Type
NPN							
60	50	100/500	0.01	6.0	3.0	70	TO-18
45	30	100/300	0.01	6.0	3.0	70	TO-18
PNP							
90	50	300/900	0.5	4.0	2.5	100	TO-18
90	50	150/450	0.5	4.0	3.5	100	TO-18
60	50	300/900	0.5	4.0	2.5	100	TO-18
60	50	150/450	0.5	4.0	3.5	100	TO-18

TABLE 6 – DARLINGTON AMPLIFIER TRANSISTORS

Darlington amplifiers are compound-connected dual transistors used in applications requiring very high current gain and input impedance. The transistors are listed first in order of decreasing breakdown voltage ( $BV_{CEO}$ ), then in order of decreasing maximum collector current ( $I_C$  max) and dc current gain ( $h_{FE}$ ).

$BV_{CEO}$ Volts Min	$I_C$ mA Max	$h_{FE}$ & $V_{CE(sat)}$ Min/Max Volts Max	$I_C$ mA	$C_{ob}$ pF Max	$f_T$ MHz Typ	Package	Device Type
NPN							
60	500	1600/8000	—	10	30	200	TO-72
60	40	2000/10000	1.0	10	10	150	TO-72
40	200	1200/—	1.0	10	30	150	TO-72
PNP							
30	1000	15000/—	2.0	500	8.0	200	TO-12
30	1000	5000/—	2.0	500	8.0	200	TO-12



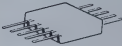
SMALL-SIGNAL HERMETIC TRANSISTORS (continued)

TABLE 7 – SILICON DUAL TRANSISTORS  
Devices Listed in Decending Order of Magnitude of  $h_{FE}$   
Dual In-House Numbers (MD) are Electrically Equivalent to the EIA Registered Counterpart

	Low Noise-High Gain Amplifiers		General Purpose Amplifiers & Switches			Core Driver App	High Speed Switches and High Frequency Oscillators	
	BV <sub>CEO</sub>		BV <sub>CEO</sub>			BV <sub>CEO</sub>	BV <sub>CEO</sub>	
	60 V	40 V	60 V	40 V	30 V	40 V	15 V	12 V
	60 V	40 V	60 V	40 V	30 V	40 V	15 V	12 V
$h_{FE_1} / h_{FE_2}$ 0.9/1.0 10%	2N2920** 2N2453A 2N2919** MD8003	2N2642** 2N2722 2N2916 2N2975 2N3043 2N2915 2N2974 2N2639** 2N3046 MD7002B MD7091 MD8001 MD8002	2N2652A 2N2060** 2N2060A 2N2223A 2N2720		2N2903A MD1129 MD1129F MD3410 MD3411 MD1121 MD1122		MD918A MD918AF MD1132 MD708A MD708AF MD2369A MD2369AF	
	NPN							
$h_{FE_1} / h_{FE_2}$ 0.8/1.0 20%	2N3817 2N3811** 2N3816 2N3810**	MD7003B	2N4015 2N4016	2N3726 MD3251A MD3251AF MD1130 MD1130F 2N4937 2N4940 MD3250A MD3250AF			MD5000A	
	PNP							
$h_{FE_1} / h_{FE_2}$ 0.8/1.0 20%	2N2643 2N2918 2N3044 2N2917 2N2640 2N3047 MD7002A		2N2652 2N2223 2N2721	2N2480A 2N2480	2N2903 MD1120 MD3409		MD918B MD918BF MD708B MD708BF	
	NPN							
$h_{FE_1} / h_{FE_2}$ 0.8/1.0 20%	2N3815 2N3809 2N3814 2N3808	MD7003A		2N4938 2N4941 MD1123			MD5000B	
	PNP							
$h_{FE_1} / h_{FE_2}$ 0.8/1.0 20%	2N2644 2N2914 2N3045 2N2453 2N2913 2N2641 2N3048 MD7002			2N5794 MD2219A MD2219AF 2N5793 MD2218A MD2218AF	MD2219 MD2219F MD7000 MD2218 MD2218F	MD3725 MD3725F	MD918 MD918F MD708 MD708F MD2369 MD2369F 2N3425	MD7005 MD7004
	NPN							
$h_{FE_1} / h_{FE_2}$ 0.8/1.0 20%	2N3813 2N3807 2N3812 2N3806	MD7003 MD7006	2N5796 MD2905A MD2905AF 2N5795 MD2904A MD2904AF	2N3727 MD2905 MD2905F MD3251 MD3251F 2N4939 2N4942 MD2904 MD2904F MD3250 MD3250F MD7007 MD7007A	MD7001 MD984	MD3467 MD3467F MD3762 MD3762F	MD5000	
	PNP							
$h_{FE_1} / h_{FE_2}$ 0.8/1.0 20%		MD6100		2N3838** 2N4854** 2N4885	MD985 MD985F MD6002 MD6002F MD6003 MD6003F MD7011 MD6001 MD6001F		MD986 MD986F	
	Complementary Pairs 1-NPN/1-PNP							



○ CASE 655-01



■ CASE 610



CASE 654-07

\*\*Motorola approved to supply JAN & JANTX product  
Bold Face Motorola preferred types – chosen using performance and cost as criteria.

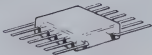


SMALL-SIGNAL HERMETIC TRANSISTORS (continued)

TABLE 8 – QUAD TRANSISTORS (Flat Pack)

Each quad transistor contains four similar transistors that can be used to reduce space requirements. These transistors are listed first in order of decreasing breakdown voltage ( $V_{CE0}$ ), then in order of decreasing maximum collector current ( $I_C$  max) and dc current gain ( $h_{FE}$ ).

$V_{CE0}$ Volts Min	$I_C$ mA Max	$h_{FE}$ & $V_{CE(sat)}$ Volts Min/Max	@ $I_C$ mA Max	$t_{on}$ ns Max	$t_{off}$ ns Max	$f_T$ MHz Typ	Device Type
NPN							
60	30	250/—	0.35	1.0	—	—	MQ2482
45	30	150/—	0.35	1.0	—	—	MQ930
40	1000	30/—	0.52	500	45	75	MQ3725
40	600	100/300	0.3	150	60	350	MQ2219A
30	600	40/120	0.4	150	60	350	MQ2218
PNP							
60	600	100/300	0.4	150	45	130	MQ2905A
60	50	300/900	0.2	0.1	—	—	MQ3799
40	1500	20/—	1.0	1000	40	120	2N5146
40	1000	20/—	0.5	500	40	120	MQ3467
40	600	40/120	0.4	150	45	130	MQ2904
40	50	100/300	0.25	10	—	—	MQ3251



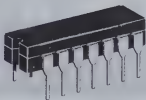
Case 607  
TO-86

TABLE 9 – QUAD TRANSISTORS (Dual-in-Line-Ceramic)

Package count and associated assembly costs can be reduced significantly with quad-packaged transistors. Each low-cost device contains four transistors in a ceramic dual-in-line package. This package, which is similar to the one used for many I/C's, is hermetic and can be easily handled by most automatic insertion equipment.

Either four matched transistors or a pair of PNP devices and a pair of NPN complements are available.

$V_{CE0}$ Volts Min	$I_C$ mA Max	$h_{FE}$ & $V_{CE(sat)}$ Volts Min/Max	@ $I_C$ mA Max	$t_{on}$ ns Max	$t_{off}$ ns Max	$f_T$ MHz Typ	Device Type
NPN							
40	500	40/—	0.4	150	30	225	MHQ2221
40	500	100/—	0.4	150	25	250	MHQ2222
30	50	300/—	0.35	1.0	—	—	MHQ2484
25	50	150/—	0.35	1.0	—	—	MHQ2483
15	500	40/—	0.25	10	9.0#	15#	MHQ2369
PNP							
60	600	100/—	0.4	150	30#	100#	MHQ2907A
60	50	300/—	0.2	0.1	—	—	MHQ3799
40	600	40/—	0.4	150	30#	100#	MHQ2906
40	50	150/—	0.2	0.1	—	—	MHQ3798
40	1.0	20/—	0.5	500	40	120	MHQ3467
12	200	25/—	0.25	50	15#	25#	MHQ3546



TO-116  
Case 632-02  
(Ceramic)

COMPLEMENTARY							$f_T$		
							NPN	PNP	
45	50	150/ —	0.25	1.0	—	—	175	130	MHQ6100A
40	50	75/ —	0.25	1.0	—	—	175	130	MHQ6100
30	300	40/ —	0.4	150	—	—		400	MHQ6001
30	300	100/ —	0.4	150	—	—		400	MHQ6002

#Typ



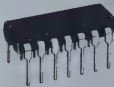
SMALL-SIGNAL HERMETIC TRANSISTORS (continued)

TABLE 10 – QUAD TRANSISTORS (Dual-in-Line-Plastic)

Each quad transistor contains four similar transistors that can be used to reduce space requirements. All the advantages of dual-in-line packaging at lower cost than ceramic packaging.

BV <sub>CEO</sub> Volts Min	I <sub>C</sub> mA Max	h <sub>FE</sub> & V <sub>CE(sat)</sub> Volts Min/Max	@ I <sub>C</sub> mA Max	t <sub>on</sub> ns Max	t <sub>off</sub> ns Max	f <sub>T</sub> MHz Min	Package	Device Type
NPN								
40	500	25/—	0.45	500	35	60	TO-116	MPQ3725
40	50	150/—	0.35	1.0	—	—	TO-116	MPQ2483
40	50	300/—	0.35	1.0	—	—	TO-116	MPQ2484
12	1000	40/200	0.33	300	15	20	TO-116	MPQ3303
PNP								
40	1000	20/—	0.5	500	40	90	TO-116	MPQ3467
40	50	150/—	0.2	0.1	—	—	TO-116	MPQ3798
60	50	300/—	0.2	0.1	—	—	TO-116	MPQ3799
COMPLEMENTARY								
30	500	40/—	0.4	150	30*	225*	TO-116	MPQ6001
30	500	100/—	0.4	150	30*	225*	TO-116	MPQ6002

\*Typ



TO-116  
Case 646  
(Plastic)

TABLE 11 – AVALANCHE TRANSISTOR

Transistor designed for AVALANCHE mode operation for the generation of high-current pulses with nanosecond rise times. Ideal for applications such as laser diodes, high-current pulse generators, vacuum tube driver and other applications requiring ultra high-speed, high-voltage or high-current pulses.

BV <sub>CER</sub> Volts Min	I <sub>C</sub> Amps Max	V <sub>0</sub> Volts Min	t <sub>d</sub> ns Max	t <sub>r</sub> ns Max	Package	Device Type
NPN						
200	5.0	100	5.0	1.0	TO-39	2N5271




CASE 79 (1)  
TO-39





SMALL-SIGNAL HERMETIC TRANSISTORS (continued)


TABLE 12 – GERMANIUM MESA RF AMPLIFIERS


		LOW CURRENT 1 mA - 50 mA			MEDIUM CURRENT 25 mA - 100 mA			
		BV <sub>CEO</sub>			BV <sub>CEO</sub>			
		35 V	25 V	15 V	35 V	25 V	15 V	
NOISE FIGURE (typ)	< 3.0 dB	f <sub>T</sub>	< 600 MHz				Usable to 500 mA △ 2N1561 △ 2N1562 ▲ 2N1692 ▲ 2N1693	
			> 600 MHz					
	< 6.0 dB	f <sub>T</sub>	< 600 MHz					
			> 600 MHz					
	> 6.0 dB	f <sub>T</sub>	< 600 MHz					
			> 600 MHz					


  
□ TO-1


  
▲ TO-102

  
● TO-9

  
TO-5

  
□ TO-18

  
△ TO-107

  
■ TO-72



# RF TRANSISTORS

Motorola offers the industry's most complete selection of silicon RF transistors. In addition to NPN and PNP low-noise small-signal transistors and ultra-fast current-mode switches, Motorola can provide RF power transistors for all communications bands at frequencies to 1.0 GHz. Transistors are available for most applications in either polarity, NPN or PNP, with a wide range of power levels. Families of RF power transistors designed for optimum operation from a 12-volt supply are available for mobile communications applications.

Many of Motorola's RF power transistors are Balanced Emitter Transistors (BET). These multiple-emitter devices feature a thin-film nichrome resistor in series with each of the individual emitters. The effect of these resistors is to distribute the current equally among the emitters and reduce the localized heating that leads to second breakdown and destruction of the transistor. Thus the Balanced Emitter Transistors make ideal output devices by virtue of their ability to withstand large mismatches without danger of second breakdown.

This Selector Guide presents information on most of Motorola's small signal devices with  $f_T$  greater than 300 MHz and RF power devices with RF power outputs greater than 1.0 Watt at frequencies greater than 2.0 MHz. Other transistors for RF applications may be found in the Selector Guides for Small-Signal Hermetic Transistors and Plastic Encapsulated Small-Signal Silicon Transistors.

Four tables in this Selector Guide cover the major application categories:

<b>RF Power Amplifiers</b>	<b>Table 1</b>
... a wide variety of devices for communications and general amplifier applications.	
<b>Low-Noise Small-Signal Amplifiers</b>	<b>Table 2</b>
... including devices designed specifically for CATV applications.	
<b>UHF and Microwave Oscillators</b>	<b>Table 3</b>
... provide high outputs at frequencies to 2.0 GHz.	
<b>High-Speed Current-Mode Switches</b>	<b>Table 4</b>
... ultra-fast switching for instrumentation applications.	

## INDEX

The following table is a numerical-alphabetical index to Silicon RF transistors manufactured by Motorola. The number of the selection table in which each device is further characterized is also listed.

Device Type	Package	Table	Device Type	Package	Table	Device Type	Package	Table
2N2857 *	TO-72	2,3	2N3866A *	TO-39	1	2N5032	TO-72	2
2N2947	TO-3	1	2N3924	TO-39	1	2N5070	TO-60	1
2N2948	TO-3	1	2N3925	TO-102	1	2N5071	TO-60	1
2N2949	TO-107	1	2N3926	TO-60	1	2N5090	TO-60	1
2N2950	TO-102	1	2N3927	TO-60	1	2N5108	TO-39	1,3
2N3137	TO-5	1	2N3948	TO-39	1	2N5109	TO-39	2
2N3287	TO-72	2	2N3950	TO-60	1	2N5160	TO-39	1
2N3288	TO-72	2	2N3959 *	TO-18	4	2N5161	TO-60	1
2N3289	TO-72	2	2N3960 *	TO-18	4	2N5162	TO-60	1
2N3290	TO-72	2	2N3961	TO-102	1	2N5179	TO-72	2,3
2N3291	TO-72	2	2N4012	TO-60	1	2N5583	TO-39	4
2N3292	TO-72	2	2N4072	TO-18	1	2N5589	144B-02	1
2N3293	TO-72	3	2N4073	TO-5	1	2N5590	145A-01	1
2N3294	TO-72	2	2N4130	TO-3	1	2N5591	145A-01	1
2N3296	TO-102	1	2N4427	TO-39	1	2N5635	144B-02	1
2N3297	TO-3	1	2N4428	TO-39	1	2N5636	144B-02	1
2N3375 *	TO-60	1	2N4957	TO-72	2	2N5637	145A-01	1
2N3553 *	TO-39	1	2N4958	TO-72	2	2N5641	144B-02	1
2N3632	TO-60	1	2N4959	TO-72	2	2N5642	145A-01	1
2N3839	TO-72	2	2N5016	TO-60	1	2N5643	145A-01	1
2N3866 *	TO-39	1,2	2N5031	TO-72	2	2N5644	145A-01	1

\*JAN and JANTX Type, also available



# RF TRANSISTORS (continued)

## INDEX (continued)

Device Type	Package	Table	Device Type	Package	Table	Device Type	Package	Table
2N5645	145A-01	1	2N6081	145A-01	1	MM1501	TO-107	3
2N5646	145A-01	1	2N6082	145A-01	1	MM1553	145C-01	1
2N5829	TO-72	2	2N6083	145A-01	1	MM4018	TO-39	1
2N5835	TO-72	4	2N6084	145A-01	1	MM4019	TO-39	1
2N5836	TO-46	4	2N6094	211-01	1	MM4049	TO-72	4
2N5837	TO-46	4	2N6095	211-01	1	MM8000	TO-39	2
2N5841	TO-72	4	2N6096	211-01	1	MM8001	TO-39	2
2N5842	TO-72	4	2N6097	211-01	1	MM8006	TO-72	2
2N5846	TO-102	1	2N6136	145A-01	1	MM8007	TO-72	2
2N5847	145A-01	1	2N6166	211-02	1	MM8008	TO-107	3
2N5848	145A-01	1	2N6255	TO-39	1	MM8009	TO-39	1,3
2N5849	145A-02	1	2N6256	249-01	1	MM8010	TO-107	3
2N5862	145A-02	1	2N6304	TO-72	2	MM8011	TO-107	3
2N5941	211-01	1	2N6305	TO-72	2	MRF207	TO-39	1
2N5942	211-02	1	2N6366	TO-102	1	MRF208	145A-01	1
2N5943	TO-39	2	2N6367	211-01	1	MRF209	145A-01	1
2N5944	244-01	1	2N6368	211-01	1	MRF501	TO-72	2
2N5945	244-01	1	2N6370	211-01	1	MRF502	TO-72	2
2N5946	244-01	1	MM1500	TO-107	3	MRF618	278-01	1
2N5947	144D-01	2	MM1501	TO-107	3	MRF5177	215	1
2N6080	145A-01	1	MM1553	145C-01	1	MRF8004	TO-39	1

\* JAN and JANTX Type, also available

TABLE 1 — RF POWER AMPLIFIERS

A wide variety of devices for communications and general amplifier applications. The transistors are listed first in order of increasing test frequency; then in order of increasing output power rating.

Test Conditions		P <sub>out</sub> Watts Min	Power Gain dB Min	BV <sub>CBO</sub> Volts Min	Package	Device Type
f MHz	@ V <sub>CC</sub> Volts					

### NPN

27	12.5	3.5	10	60	TO-39	MRF8004
30	12.5	2.5PEP	17	36	TO-102	2N6366
30	30	3.0PEP	16	60	TO-102	2N3296
30	12.5	9.0PEP	14	18	211-01	2N6367
30	28	10PEP	12	65	211-01	2N6370
30	30	12PEP	10	60	TO-3	2N3297
30	25	15	7.0	40	TO-3	2N2948
30	28	25PEP	13	65	TO-60	2N5070
30	12.5	40PEP	10	36	211-01	2N6368
30	28	40PEP	13	65	211-01	2N5941
30	28	80PEP	13	65	211-02	2N5942
50	12.5	3.5	10	36	TO-102	2N5846
50	25	3.5	10	60	TO-107	2N2949
50	25	3.5	10	60	TO-102	2N2950
50	12.5	8.0	10	36	145A-01	2N5847
50	25	15	7.0	60	TO-3	2N2947
50	12.5	20	8.0	48	145A-01	2N5848
50	12.5	40	7.5	48	145A-02	2N5849
50	28	50	8.0	65	TO-60	2N3950
70	28	50	8.0	80	TO-3	2N4130
76	28	24	9.0	65	TO-60	2N5071
100	28	7.5	8.8	65	TO-60	2N3375†
150	27	75	7.0	65	145A-02	2N5862
150	44	75	8.2	100	145C-01	MM1553
150	28	100	4.5	65	211-02	2N6166
175	13.6	0.25	10	40	TO-18	2N4072
175	13.6	0.5	10	40	TO-39	2N4073
175	12	1.0	10	40	TO-39	2N4427
175	28	2.5	10	65	TO-39	2N3553†
175	12.5	3.0	7.8	36	TO-39	2N6255
175	13.6	3.0	8.2	36	144B-03	2N5589
175	12.5	4.0	12	36	145A-01	2N6080
175	13.6	4.0	6.0	36	TO-39	2N3924
175	28	4.0	9.0	65	TO-102	2N3961
175	13.6	5.0	5.9	36	TO-102	2N3925
175	13.6	7.0	5.5	36	TO-60	2N3926
175	28	7.0	8.4	65	144B-03	2N5641

† JAN Types Also Available

‡ Tripler Output



# RF TRANSISTORS (continued)

TABLE 1 (continued)

Test Conditions			P <sub>out</sub> Watts Min	Power Gain dB Min	BV <sub>CBO</sub> Volts Min	Package	Device Type
f MHz	@ V <sub>CC</sub> Volts						

## NPN (continued)

175	13.6	10	5.2	36	145A-01	2N5590
175	13.6	12	4.8	36	TO-60	2N3927
175	28	13.5	5.9	65	TO-60	2N3632
175	12.5	15	6.3	36	145A-01	2N6081
175	28	20	8.2	65	145A-01	2N5642
175	12.5	25	6.2	36	145A-01	2N6082
175	13.6	25	4.4	36	145A-01	2N5591
175	12.5	30	5.7	36	145A-01	2N6083
175	12.5	40	4.5	36	145A-01	2N6084
220	12.5	1.0	8.2	36	TO-39	MRF207
220	12.5	10	10	36	145A-01	MRF208
220	12.5	25	4.4	36	145A-01	MRF209
175	28	40	7.6	65	145A-01	2N5643
250	20	0.4	6.0	40	TO-39	2N3137
400	28	1.0	10	55	TO-39	2N3866
400	28	1.0	10	55	TO-39	2N3866A
400	13.6	1.0	6.0	36	TO-39	2N3948
400	28	1.2	5.5	55	TO-60	2N5090
400	28	2.5	6.2	60	144B-03	2N5635
400	28	7.5	5.7	60	144B-03	2N5636
400	28	15	4.8	65	TO-60	2N5016
400	28	20	4.6	60	145A-01	2N5637
400	28	30	6.0	60	215	MRF5177
470	12.5	0.5	7.0	36	249-01	2N6256
470	12.5	1.0	7.0	36	145A-01	2N5644
470	12.5	2.0	9.0	36	244-01	2N5944
470	12.5	4.0	8.0	36	244-01	2N5945
470	12.5	4.0	6.0	36	145A-01	2N5645
470	12.5	10	6.0	36	244-01	2N5946
470	12.5	12	4.7	36	145A-01	2N5646
470	12.5	25	4.0	36	145A-01	2N6136
500	28	0.75	10	55	TO-39	2N4428
520	12.5	15	6.0	36	278-01	MRF618
1000	28	0.9	4.5	55	TO-39	MM8009
1000	28	1.0	5.0	55	TO-39	2N5108
1000	28	2.5‡		65	TO-60	2N4012

## PNP

175	12.5	0.5	10	40	TO-39	MM4018
175	28	2.5	10	60	TO-39	MM4019
175	12.5	4.0	12	36	211-01	2N6094
175	28	7.5	8.8	60	TO-60	2N5161
175	12.5	15	6.3	36	211-01	2N6095
175	12.5	30	5.7	36	211-01	2N6096
175	28	30	6.0	60	TO-60	2N5162
175	12.5	40	4.5	36	211-01	2N6097
400	28	1.0	8.0	60	TO-39	2N5160

† JAN Types Also Available

‡ Tripler Output

TABLE 2 – LOW-NOISE SMALL-SIGNAL AMPLIFIERS

Including devices designed specifically for CATV applications. The transistors are listed first in order of increasing test frequency, then in order of increasing noise figure.

Test Conditions			NF dB Max	Power Gain dB Min	f <sub>T</sub> MHz Min	Package	Device Type
f MHz	@ V <sub>CE</sub> Volts						

## NPN

200	15	2.7*	11.4*	700	TO-39	MM8000
200	15	2.7*	11.4*	900	TO-39	MM8001
200	15	3.0*	11	1200	TO-39	2N5109
200	6.0	4.0*	17*	800	TO-72	MRF502
200	6.0	4.5*	15*	600	TO-72	MRF501

\*Typical



RF TRANSISTORS (continued)

TABLE 2 (continued)

Test Conditions		NF dB Max	Power Gain dB Min	f <sub>T</sub> MHz Min	Package	Device Type
f MHz	@ V <sub>CE</sub> Volts					
NPN (Continued)						
200	6.0	4.5	15	900	TO-72	2N5179
200	10	6.0	17	350	TO-72	2N3287
200	10	6.0	17	350	TO-72	2N3288
200	10	7.0	17	300	TO-72	2N3289
200	10	7.0	17	300	TO-72	2N3290
200	10	7.0 *	14	250	TO-72	2N3294
200	15	8.0	11.4 *	1200	TO-39	2N5943
200	10	8.0	16	250	TO-72	2N3291
200	20	8.5	10	1100	144D-01	2N5947
200	10	9.0	16	250	TO-72	2N3292
450	6.0	2.5	14	1000	TO-72	2N5031
450	6.0	3.0	14	1000	TO-72	2N5032
450	6.0	3.4	12.5	1000	TO-72	2N3839
450	6.0	3.8	14	1000	TO-72	MM8006
450	6.0	4.5	12.5	1000	TO-72	2N2857†
450	5.0	4.5	12	1200	TO-72	2N6305
450	6.0	5.0	12	1000	TO-72	MM8007
450	5.0	5.5	15	1400	TO-72	2N6304
PNP						
450	10	2.5	17	1200	TO-72	2N5829
450	10	3.0	17	1200	TO-72	2N4957
450	10	3.3	16	1000	TO-72	2N4958
450	10	3.8	15	1000	TO-72	2N4959

\*Typical  
†JAN Type Also Available

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TABLE 3 – UHF and MICROWAVE OSCILLATORS

The transistors are listed first in order of increasing test frequency; then in order of increasing oscillator output power.

Test Conditions		P <sub>out</sub> (Oscillator)	f <sub>T</sub> MHz	BV <sub>CBO</sub> Volts		Device Type
f MHz	@ V <sub>CE</sub> Volts	mW Min	Min	Min	Package	
NPN						
257	10	2.0	250	20	TO-72	2N3293
500	10	20	900	20	TO-72	2N5179
500	10	30	1000	30	TO-72	2N2857†
1500	20	150	1000*	30	TO-107	MM1501
1500	20	250	1500*	30	TO-107	MM1500
1680	20	300*	1000	55	TO-39	MM8009
1680	20	300*	1200	55	TO-39	2N5108
2000	20	100	1100*	35	TO-107	MM8011
2000	20	200	1100*	35	TO-107	MM8010
2000	20	300	1100*	35	TO-107	MM8008

\*Typical    †JAN Type Also Available



RF TRANSISTORS (continued)

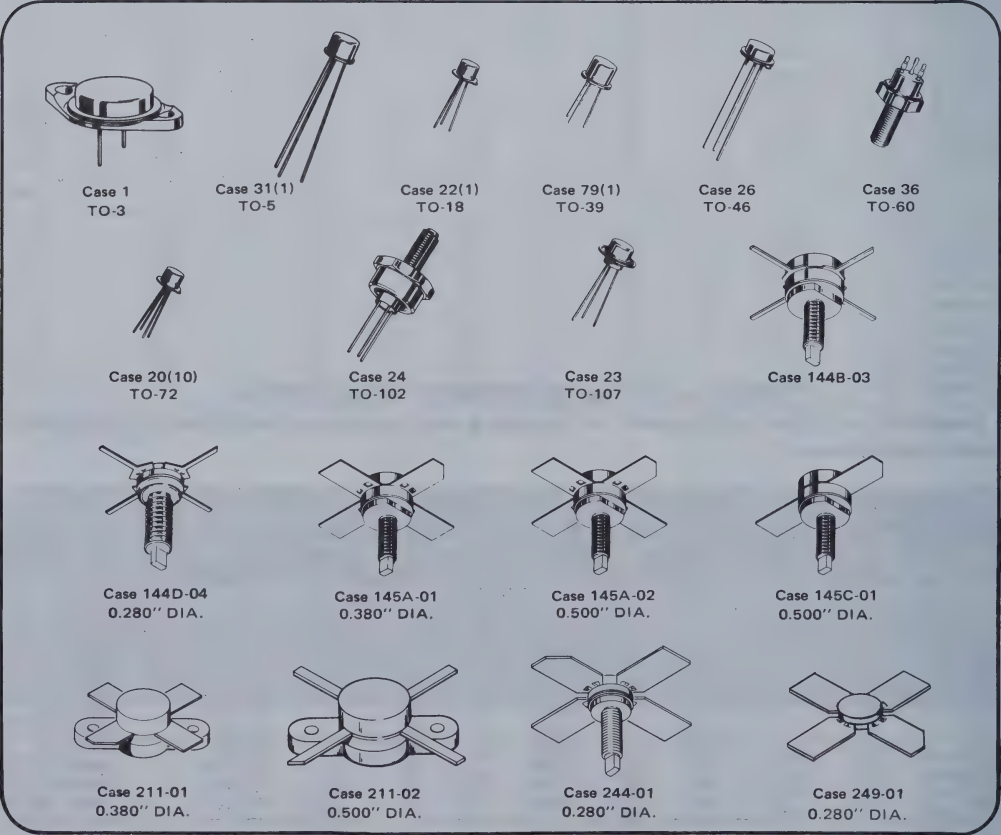
TABLE 4 – HIGH-SPEED CURRENT MODE SWITCHES

Ultra-fast switching for instrumentation applications is provided by these devices which feature high  $f_T$  and low  $r_b'C_c$  over a wide range of collector current. The transistors are listed first in order of increasing collector current (test) and then in order of increasing  $f_T$ .

Test Conditions			f <sub>T</sub> MHz Min	r <sub>b</sub> 'C <sub>c</sub> ps Max	C <sub>cb</sub> pF Max	Package	Device Type
I <sub>C</sub> mA	@	V <sub>CE</sub> Volts					
NPN							
10		10	1300	25	2.5**	TO-18	2N3959†
10		10	1600	40	2.5**	TO-18	2N3960†
10		6.0	2500	5.0*	0.8	TO-72	2N5835
25		4.0	1700	40	1.5	TO-72	2N5842
25		4.0	2200	25	1.5	TO-72	2N5841
50		6.0	2000	6.0*	3.5	TO-46	2N5836
100		3.0	1700	6.0*	5.0	TO-46	2N5837
PNP							
25		5.0	4000	15	1.25**	TO-72	MM4049
100		10	1300	8.0*	5.0	TO-39	2N5583

\*Typical  
\*\* $C_{cb}$   
†JAN Types Also Available

RF transistors are available in a variety of packages for many applications.





## RF MODULES

Motorola has the capability to produce many diverse types of modules for high-frequency and high-power performance.

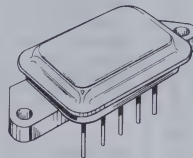
These modules offer advantages in miniaturization, performance, economy, flexibility and reliability.

This section lists standard RF modules.

**TABLE 1 – WIDEBAND AMPLIFIER MODULES**

These modules are designed for amplifier applications in CATV distribution equipment. The devices are listed in increasing order of Noise Figure (NF).

Case 270-01

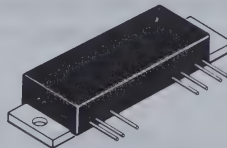


NF dB Max	Output Level dB/mV/N-Channel	Frequency Range MHz	G <sub>p</sub> dB Min	IMD dB Max	Input and Output Return Loss @ z <sub>0</sub> = 75 Ohms Min	P <sub>D</sub> Watts Max	Case	Device Case
7.5	47/21	40-300	15	-69	16	5.0	270-01	MHW559
8.5	44/21	40-300	14.5	-62	16	5.0	270-01	MHW560
10	51/12	3-120	15	-66	16	4.5	270-01	MHW563
10	47/21	40-300	14	-69	16	6.0	270-01	MHW562
12	50/21	40-300	14	-69	16	6.0	270-01	MHW561

**TABLE 2 – UHF POWER MODULES**

These modules are designed for Land Mobile Communications equipment in the UHF band with a frequency range\* of 400 to 470 MHz. The devices are listed in increasing order of Output Power (P<sub>out</sub>).

CASE 700-01



P <sub>out</sub> Watts Min	Frequency Range MHz	Z <sub>in</sub> Z <sub>0</sub> = 50 Ohms Max	G <sub>p</sub> dB Min	N % Min	Case	Device Type
7.5	400-470	2:1	18.8	35	700-01	MHW709
13	400-470	2:1	19.4	35	700-01	MHW710

\*Frequency Range is covered in two bands:  
MHW709-1, MHW710-1 400-440 MHz  
MHW709-2, MHW710-2 440-470 MHz



# MICROWAVE DEVICES

## POWER VARACTOR MULTIPLIERS

Varactor multipliers take over at frequencies where transistors leave off. Motorola's line of step-recovery multipliers represents a selection of the more popular frequency doublers, triplers and high-order type. Output capabilities range from 15 watts at 450 MHz to 1 watt at 10 GHz. The table is arranged in order of decreasing output frequency.






$f_{out}$ MHz	$P_{out}$ (Min) Watts	$f_{in}$ MHz	$P_{in}$ Watts	 CASE 48	 CASE 46	 CASE 47	 CASE 45	 CASE 44
10,000	1.0	5000	2.6	1N5156	1N5157	—	MV1812D	—
6400	0.25	800	1.0	MV1817-1A	MV1817-1B	—	MV1817-1D	—
6400	0.2	800	1.0	MV1817A	MV1817B	—	MV1817D	—
6000	2.0	2000	5.0	MV1810-1A	1N5155A	—	MV1810-1D	—
6000	2.0	2000	5.0	1N5154	1N5155	—	MV1810D	—
4000	7.2	2000	12	MV1811-1A	MV1811-1B	MV1811-1C	MV1811-1D	MV1811-1J
4000	5.0	2000	10	MV1811A	MV1811B	MV1811C	MV1811D	MV1811J
2400	0.75	300	3.0	MV1816-1A	MV1816-1B	—	MV1816-1D	—
2400	0.6	300	3.0	MV1816A	MV1816B	—	MV1816D	—
2000	14.5	1000	25	—	—	MV1809-1C	—	MV1809-1J
2000	10.4	1000	20	—	—	MV1809C	—	MV1809J
2000	7.2	1000	12	MV1808-1A	1N5152A	1N5153A	MV1808-1D	MV1808-1J
2000	6.0	1000	12	1N5151	1N5152	1N5153	MV1808D	MV1808J
1000	25.1	500	37	—	—	1N5150A	—	MV1807-1J
1000	24	500	37	—	—	1N5150	—	MV1807J
1000	11	500	20	—	—	1N5149	—	1N4388
750	26	250	40	—	—	MV1805C	—	MV1805J
450	15	150	30	—	—	MV1804C	—	1N4387

FIGURE 1 — Typical Doubling Performance

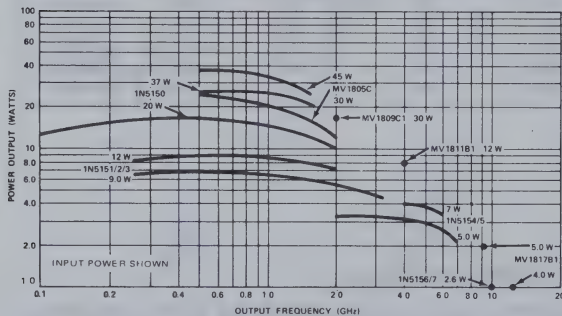
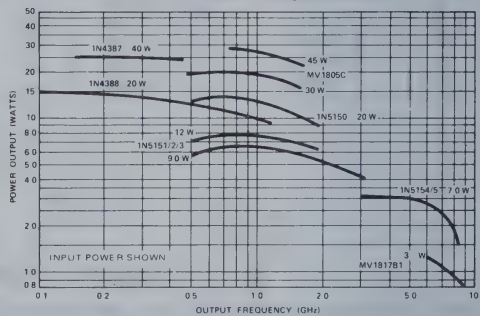


FIGURE 2 — Typical Tripling Performance



## PIN SWITCHING DIODES

PIN switching diodes designed for VHF band switching and general-purpose switching. Supplied in the low-inductance Mini-L package and ideal for low-cost, high-volume requirements.



Case 226



Case 166-02  
(Micro-I)

### ELECTRICAL CHARACTERISTICS

Device Type	Case	$V_{(BR)R}$ $I_R = 10 \mu A_{dc}$ Volts Min	$R_S$ $I_F = 10 mA_{dc}$ Ohms Max	$C_T$ $V_R = 20 V$ $f = 1.0 MHz$ pF Max	$L_S$ $f = 250 MHz$ nH Typ	$C_C$ $f = 1.0 MHz$ pF Typ
MPN3401	226	35	0.7	1.0	3.0	1.0
MPN3402	226	35	0.6	2.0	3.0	1.0

### MICRO-I PIN SWITCHING DIODE

MPI-3401	166-01	35	0.7	1.0	3.0	0.15
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MICROWAVE DEVICES (continued)

DUAL EPICAP TUNING DIODE



CASE 29(15)  
TO-92

Device Type	$C_T$ , Diode Capacitance $f = 1.0 \text{ MHz}$ $V_R = 3.0 \text{ Vdc}$ , pF		$C_R$ , Capacitance Ratio $C_3/C_{30}$ $f = 1.0 \text{ MHz}$		$Q$ , Figure of Merit $V_R = 3.0 \text{ Vdc}$ $f = 100 \text{ MHz}$
	Min	Max	Min	Max	Min
MV104	37	42	2.5	2.8	100

MINI-L ABRUPT JUNCTION TUNING DIODES



CASE 226

Device Type	$C_T$ Diode Capacitance $V_R = 4.0 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ pF	$C_R$ , Capacitance Ratio $C_2/C_{30}$ $f = 1.0 \text{ MHz}$	$Q$ , Figure of Merit $V_R = 4.0 \text{ Vdc}$ , $f = 100 \text{ MHz}$
	Min/Max	Min	Min
MV3501	6.1/7.5	2.7	225
MV3502	7.4/9.0	2.8	225
MV3503	9.0/11	2.8	200
MV3504	10.8/13.2	2.8	200
MV3505	13.5/16.5	2.9	200
MV3506	16.2/19.8	2.9	175
MV3507	19.8/24.2	2.9	175



# EPICAP TUNING DIODES

(Voltage-Variable Capacitance Diodes)



CASE 45



CASE 51



CASE 146



CASE 166-02



CASE 182

Nominal Capacitance pF @ $V_R = 4.0$ V, $f = 1.0$ MHz	Device Type	Capacitance Ratio @		Q @ 4.0 V, $f = 50$ MHz $f = 100$ MHz* $f = 20$ MHz†		Maximum Working Voltage	Case
		pF Min/Typ Min/Max*	V1/V2	Min			
1.0	MV1858D (1)	2.1/2.7	C4/C60	350*		60	45
2.2	MV1860D (2)	2.5/3.1	C4/C60	350*		60	45
3.3	MV1862D	2.6/3.3	C4/C60	300*		60	45
4.7	MV1863D	2.6/3.3	C4/C60	300*		60	45
6.8	MV1864D	2.7/3.4	C4/C60	300*		60	45
	1N5139 (3)	2.7/2.9	C4/C60	350		60	51
	1N5461A (4)	2.7/3.1*	C2/C30	600		30	51
	1N5441A (4)	2.5/3.1*	C2/C30	450		30	51
	MV2101	2.5/3.2*	C2/C30	450		30	182
	MV2201	1.9/2.3*	C1/C10	300		25	182
	MV1620	2.0/2.2	C2/C20	300		20	51
8.2	MV1865D	2.7/3.4	C4/C60	300*		60	45
	1N5462A (4)	2.8/3.1*	C2/C30	600		30	51
	1N5442A (4)	2.5/3.1*	C2/C30	450		30	51
	MV2102	2.5/3.2*	C2/C30	450		30	182
	MV1622	2.0/2.2	C2/C20	300		20	51
10	MV1866D	2.8/3.5	C4/C60	250*		60	45
	1N5140 (3)	2.8/3.0	C4/C60	300		60	51
	MV1866	3.0/3.1*	C4/C60	500		60	51
	1N5463A (4)	2.8/3.1*	C2/C30	550		30	51
	1N5443A (4)	2.6/3.1*	C2/C30	400		30	51
	MV2103	2.5/3.2*	C2/C30	400		30	182
	MV2203	2.0/2.4*	C1/C10	200		25	182
	MV1624	2.0/2.3	C2/C20	300		20	51
12	MV1868D	2.8/3.5	C4/C60	200*		60	45
	1N5141 (3)	2.8/3.0	C4/C60	300		60	51
	MV1868	3.0/3.1*	C4/C60	500		60	51
	1N5464 (4)	2.8/3.1*	C2/C30	550		30	51
	1N5444A (4)	2.6/3.1*	C2/C30	400		30	51
	MV2104	2.5/3.2*	C2/C30	400		30	182
	MV1626	2.0/2.3	C2/C20	300		20	51
15	MV1870D	2.8/3.5	C4/C60	200*		60	45
	1N1542 (3)	2.8/3.0	C4/C60	250		60	51
	MV1870	3.0/3.2*	C4/C60	400		60	51
	1N5465A (4)	2.8/3.1*	C2/C30	550		30	51
	1N5445A (4)	2.6/3.1*	C2/C30	400		30	51
	MV2105	2.5/3.2*	C2/C30	400		30	182
	MV830	1.8/2.0	C4/C25	30		30	51
	MV2205	2.1/2.5*	C1/C10	200		25	182
	MV1628	2.0/2.3	C2/C20	250		20	51
18	1N5143 (3)	2.8/3.0	C4/C60	250		60	51
	MV1871	3.0/3.2*	C4/C60	400		60	51
	1N5466A (4)	2.9/3.1*	C2/C30	500		30	51
	1N5446A (4)	2.7/3.1*	C2/C30	350		30	51
	MV2106	2.5/3.2*	C2/C30	350		30	182
	MV831	1.8/2.0	C4/C25	25		30	51
	MV1630	2.0/2.3	C2/C20	250		20	51

See Footnote on page 5-86



EPICAP TUNING DIODES (continued)

Nominal Capacitance pF @ $V_R = 4.0\text{ V}$ , $f = 1.0\text{ MHz}$	Device Type	Capacitance Ratio @		$Q$ @ $4.0\text{ V}$ , $f = 50\text{ MHz}$ $f = 100\text{ MHz}^*$ $f = 20\text{ MHz}^\dagger$ Min	Maximum Working Voltage	Case
		pF Min/Typ Min/Max*	V1/V2			
20	1N5467A (4)	2.9/3.1*	C2/C30	500	30	51
	1N5447A (4)	2.6/3.1*	C2/C30	350	30	51
	MV1632	2.0/2.3	C2/C20	250	20	51
22	1N5144 (3)	3.2/3.4	C4/C60	200	60	51
	MV1872	3.2/3.3*	C4/C60	400	60	51
	1N5468A (4)	2.9/3.2*	C2/C30	500	30	51
	1N5448A (4)	2.6/3.2*	C2/C30	350	30	51
	MV2107	2.5/3.2*	C2/C30	350	30	182
	MV832	1.8/2.1	C4/C25	25	30	51
	MV1634	2.0/2.3	C2/C20	250	20	51
27	1N5145 (3)	3.2/3.4	C4/C60	200	60	51
	MV1874	3.2/3.3*	C4/C60	300	60	51
	1N5469A (4)	2.9/3.2*	C2/C30	500	30	51
	1N5449A (4)	2.6/32.*	C2/C30	350	30	51
	MV2108	2.5/3.2*	C2/C30	300	30	182
	MV833	1.8/2.1	C4/C25	25	30	51
	MV1636	2.0/2.3	C2/C20	200	20	51
33	1N5146 (3)	3.2/3.4	C4/C60	200	60	51
	MV1876	3.2/3.4*	C4/C60	300	60	51
	1N5470A (4)	2.9/3.2*	C2/C30	500	30	51
	1N5450A (4)	2.6/3.2*	C2/C30	350	30	51
	MV2109	2.5/3.2*	C2/C30	200	30	182
	MV834	1.9/2.12	C4/C25	20	30	51
	MV2209	2.1/2.5*	C1/C10	150	25	182
39	MV1638	2.0/2.4	C2/C20	200	20	51
	1N5147 (3)	3.2/3.4	C4/C60	200	60	51
	MV1877	3.2/3.4*	C4/C60	300	60	51
	1N5471A (4)	2.9/3.2*	C2/C30	450	30	51
	1N5451A (4)	2.6/3.2*	C2/C30	300	30	51
	MV2110	2.5/3.2*	C2/C30	150	30	182
	MV835	1.9/2.12	C4/C25	20	30	51
47	MV1640	2.0/2.4	C2/C20	200	20	51
	1N5148 (3)	3.2/3.4	C4/C60	200	60	51
	MV1878	3.2/3.4*	C4/C60	300	60	51
	1N5472A (4)	2.9/3.2*	C2/C30	400	30	51
	1N5452A (4)	2.6/3.2*	C2/C30	250	30	51
	MV2111	2.5/3.2*	C2/C30	150	30	182
	MV836	1.9/2.15	C4/C25	15	30	51
56	MV1642	2.0/2.4	C2/C20	200	20	51
	1N5473A (4)	2.9/3.3*	C2/C30	300	30	51
	1N5453A (4)	2.6/3.3*	C2/C30	200	30	51
	MV2112	2.6/3.3*	C2/C30	150	30	182
	MV837	1.9/2.15	C4/C25	15	30	51
	MV1644	2.0/2.4	C2/C20	150	20	51
68	1N5474A (4)	2.9/3.3*	C2/C30	250	30	51
	1N5454A (4)	2.7/3.3*	C2/C30	175	30	
	MV2113	2.6/3.3*	C2/C30	150	30	182
	MV838	2.0/2.18	C4/C25	15	30	51
	MV1646	2.0/2.4	C2/C20	150	20	51
82	1N5475A (4)	2.9/3.3*	C2/C30	225	30	51
	1N5455A (4)	2.7/3.3*	C2/C30	175	30	51
	MV2114	2.6/3.3*	C2/C30	100	30	182
	MV839	2.0/2.18	C4/C25	10	30	51
	MV1648	2.0/2.4	C2/C20	150	20	51

See Footnote on page 5-86



EPICAP TUNING DIODES (continued)

Nominal Capacitance pF @ $V_R = 4.0\text{ V}$ , $f = 1.0\text{ MHz}$	Device Type	Capacitance Ratio @ pF Min/Typ Min/Max*		Q @ $4.0\text{ V}$ , $f = 50\text{ MHz}$ $f = 100\text{ MHz}^*$ $f = 20\text{ MHz}^\dagger$ Min	Maximum Working Voltage	Case
			V1/V2			
100	1N5476A (4)	2.9/3.3*	C2/C30	200	30	51
	1N5456A (4)	2.7/3.3*	C2/C30	175	30	51
	MV2115	2.6/3.3*	C2/C30	100	30	182
	MV840	2.0/2.18	C4/C25	10	30	51
	MV1650	2.0/2.4	C2/C20	150	20	51
120	MV1652	-/2.6	C2/C20	250†	20	146
	MV2301	2.3/-	C2/C20	250†	20	182
150	MV1654	-/2.6	C2/C20	250†	20	146
	MV2302	2.3/-	C2/C20	250†	20	182
180	MV1656	-/2.6	C2/C20	200†	20	146
	MV2303	2.3/-	C2/C20	200†	20	182
200	MV1658	-/2.6	C2/C20	200†	20	146
	MV2304	2.3/-	C2/C20	200†	20	182
220	MV1660	-/2.6	C2/C20	150†	20	146
	MV2305	2.3/-	C2/C20	150†	20	182
250	MV1662 (5)	-/2.3	C2/C20	150†	20	146
	MV2306	2.3/-	C2/C20	150†	20	182
270	MV1664 (5)	-/2.3	C2/C20	100†	20	146
	MV2307	2.3/-	C2/C20	100†	20	182
330	MV1666 (5)	-/2.3	C2/C20	100†	20	146
	MV2308	2.3/-	C2/C20	100†	20	182

(1)  $C_T = \pm 30\%$

(2)  $C_T = \pm 20\%$

(3) Add Suffix "A" for  $\pm 50\%$   $C_T$  Tolerance

(4) Substitute "B" Suffix for  $\pm 50\%$   $C_T$  Tolerance "C" Suffix for  $\pm 20\%$   $C_T$

(5) Capacitance Ratio is C2/C15

5

SILICON EPICAP MICRO-I DIODES

... designed in the popular PLASTIC PACKAGE for high volume requirements of FM Radio and TV tuning and AFC, general frequency control and tuning applications; providing solid-state reliability in replacement of mechanical tuning methods.



CASE 166-02

Device	$C_T$ , Diode Capacitance $V_R = 4.0\text{ Vdc}$ , $f = 1.0\text{ MHz}$ pF			Q, Figure of Merit $V_R = 4.0\text{ Vdc}$ $f = 100\text{ MHz}$	TR, Tuning Ratio $C_2/C_{30}$ $f = 1.0\text{ MHz}$		Color Code	
	Min	Nom	Max		Min	Max	Top	Bottom
MVI-2097	0.8	1.0	1.2	325	2.0	2.4	None	None
MVI-2098	1.8	2.2	2.7	325	2.0	2.8	None	Brown
MVI-2099	2.6	3.3	4.0	300	2.2	2.9	None	Red
MVI-2100	3.7	4.7	5.7	300	2.4	2.9	None	Orange
MVI-2101	6.1	6.8	7.5	275	2.5	3.3	None	Yellow
MVI-2102	7.3	8.2	9.0	275	2.6	3.3	None	Green
MVI-2103	9.0	10	11	275	2.6	3.3	None	Blue
MIV-2104	10.8	12	13.2	275	2.6	3.3	None	Violet
MVI-2105	13.5	15	16.5	275	2.6	3.3	None	Gray
MVI-2106	16.2	18	19.8	250	2.7	3.3	None	White
MVI-2107	19.8	22	24.2	200	2.7	3.3	Brown	None
MVI-2108	24.3	27	29.7	200	2.7	3.3	Brown	Brown
MVI-2109	29.7	33	36.3	200	2.7	3.3	Brown	Red



## TUNING DIODE REGULATOR



CASE 182-01

Highly reliable temperature compensated monolithic integrated circuit voltage stabilizer designed for use in television and FM radios that use variable capacitance diode tuners.

Device Type	V <sub>Z</sub> Volts Min/Max	I <sub>Z</sub> mA	$\frac{\Delta V_Z}{\Delta T}$ mV/°C Min/Max	Z <sub>Z</sub> Ohms Max	P <sub>D</sub> mW
MVS460	31/35	18	-3.1/+1.55	25	625

5

## HYPER-ABRUPT JUNCTION TUNING DIODES



CASE 146



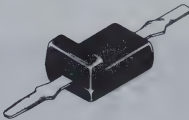
CASE 51

...designed with a capacitance change of greater than TEN TIMES for a bias change ranging from 2 to 10 volts. Provides tuning over broad frequency ranges, tuning AM radio broadcast band, general AFC and tuning applications in lower RF frequencies.

Device Type	C <sub>T</sub> Diode Capacitance		C <sub>R</sub> , Capacitance Ratio		Q, Figure of Merit	Case
	V <sub>R</sub> = 1.0 Vdc f = 1.0 MHz pF nom ± 15%	V <sub>R</sub> = 2.0 Vdc f = 1.0 MHz pF nom ± 20%	C <sub>1</sub> /C <sub>10</sub> f = 1.0 MHz Min	C <sub>2</sub> /C <sub>10</sub> f = 1.0 MHz Min	V <sub>R</sub> = 2.0 Vdc f = 1.0 MHz Min	
MV1401	550	—	14	—	200	146
MV1403	—	175	—	10	200	51
MV1404	—	120	—	10	200	51
MV1405	—	250	—	10	200	51



HYPER-ABRUPT JUNCTION TUNING DIODES (continued)



CASE 226

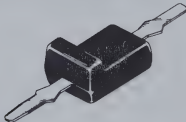
...designed in the new low-inductance mini-L package for high volume requirements of UHF and VHF TV tuning and AFC, general frequency control and tuning applications, providing solid-state reliability in replacement of mechanical tuning methods.

Device Type	C <sub>T</sub> Diode Capacitance V <sub>R</sub> = 3.0 Vdc, V <sub>R</sub> = 25 V* f = 1.0 MHz pF		C <sub>R</sub> Capacitance Ratio C <sub>3</sub> /C <sub>25</sub> f = 1.0 MHz Min	Q, Figure of Merit V <sub>R</sub> = 3.0 Vdc *f = 50 MHz f = 100 MHz Min
	Min/Max			
BB105A	2.3/2.8*		4.0	225
BB105B	2.0/2.3*		4.5	225
BB105G	1.8/2.8*		4.0	150
MV3102	20/25		4.5	300*
MV3103	19/26		4.0	200*
MV3140	-/2.3*		4.5	150
MV3141	-/3.2*		4.0	150
MV3142	-/3.2*		3.5	50

PLASTIC HOT-CARRIER DIODES



CASE 166-02



CASE 226



CASE 182-01

Hot-Carrier diodes are ideal for VHF and UHF mixer and detector applications as well as many higher microwave frequency applications. They provide stable electrical characteristics by eliminating the point-contact diode presently used in many applications. Motorola has the capability of supplying these devices in a variety of packages.

Device Type	Case	ELECTRICAL CHARACTERISTICS					
		V(BR)R Reverse Break-down Voltage I <sub>R</sub> = 10 μA Volts Min	C <sub>T</sub> Diode Capacitance V <sub>R</sub> = 0 V, f = 1.0 MHz (1) V <sub>R</sub> = 20 V, f = 1.0 MHz (2) pF Max	V <sub>F</sub> Forward Voltage I <sub>F</sub> = 10 mA Volts Max	I <sub>R</sub> Reverse Leakage V <sub>R</sub> = 3.0 V (3) V <sub>R</sub> = 25 V (4) V <sub>R</sub> = 35 V (5) μA Max	NF Noise Figure dB Max	t <sub>rr</sub> (Note 1) Reverse Recovery ps Max
MBD101	182-01	4.0	1.0 (1)	0.6	0.25 (3)	7.0	—
MBD501	↓	50	1.0 (2)	1.2	0.20 (4)	—	100
MBD701		70	1.0 (2)	1.2	0.20 (5)	—	100
MBD102	226	4.0	1.0 (1)	0.6	0.25 (3)	7.0	—
MBD502		50	1.0 (2)	1.2	0.20 (4)	—	100
MBD702		70	1.0 (2)	1.2	0.20 (5)	—	100

MICRO-I HOT-CARRIER DIODE

MBI-101	166-02	4.0	1.0 (1)	0.6	0.25 (3)	7.0	—
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Note 1: Kakauer method



# MICRO-T TRANSISTORS AND DIODES

The Micro-T package is a tiny (0.085 inch diameter) injection-molded plastic and ceramic package for applications requiring extremely high component mounting density. Micro-T transistors and diodes are also useful in hybrid circuits—being easier to mount than unencapsulated semiconductor chips, without special equipment and special operator training.

The following tables list the major characteristics of Motorola transistors and diodes in Micro-T packages. Devices are grouped in applications categories to simplify device selection. For more detailed information, refer to the individual data sheet.

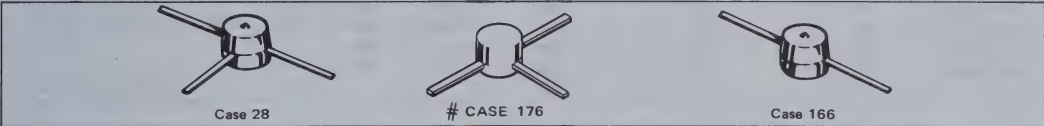


TABLE I – GENERAL-PURPOSE AMPLIFIER AND SWITCHING TRANSISTORS

Case 28 (1): # Case 176												
Device Type	VCE0 Volts Max	Collector Test Current for Optimum hFE	hFE	VCE(sat) @ IC		fT @ IC		Switching Times ns(Typ) @ IC/IB1/IB2				
		IC in mA	Min/Max	Volts Max	mA	MHz Min	mA	tD	tR	tS	tF	mA
NPN												
MMT3904	40	10	100/300	0.2	10	300	10	24	13	125	11	10/1.0/1.0
MMT3903	40	10	50/150	0.2	10	250	10	24	13	125	11	10/1.0/1.0
MMT2222	30	150	100/300	0.4	150	200	20	ton = 16, toff = 160				150/15/15
#MMCM2222	30	150	100/300	0.4	150	200	20	ton = 16, toff = 160				150/15/15
MMT76	20	10	50/400	—	—	—	—	24	13	125	11	10/1.0/1.0
PNP												
MMT2907	40	150	100/300	0.4	150	200	50	ton = 20, toff = 150				150/15/15
#MMCM2907	40	150	100/300	0.4	150	200	50	ton = 20, toff = 150				150/15/15
MMT3906	40	10	100/300	0.25	10	250	10	25	18	140	15	10/1.0/1.0
MMT3905	40	10	50/150	0.25	10	200	10	25	18	140	15	10/1.0/1.0
MMT75	20	10	50/400	—	—	—	—	25	18	140	15	10/1.0/1.0

TABLE II – HIGH SPEED SATURATED SWITCHING TRANSISTORS

Case 28 (1) # Case 176												
Device Type	V <sub>CE0</sub> Volts Max	Collector Test Current for Optimum h <sub>FE</sub> I <sub>C</sub> in mA	h <sub>FE</sub> Min/Max	V <sub>CE(sat)</sub> @ I <sub>C</sub>		f <sub>T</sub> @ I <sub>C</sub>		Switching Times ns (Max) @ I <sub>C</sub> /I <sub>B</sub>				
				Volts Max	mA	MHz Min	mA	t <sub>d</sub>	t <sub>r</sub>	t <sub>s</sub>	t <sub>f</sub>	mA
NPN												
MMT2369	15	10	40/120	0.25	10	500	10	t <sub>on</sub> = 12, t <sub>off</sub> = 18				10/3.0
#MMCM2369	15	10	40/120	0.25	10	500	10	t <sub>on</sub> = 12, t <sub>off</sub> = 18				10/3.0
	20	30	50/200	0.22	30	350	30	t <sub>on</sub> = 16, t <sub>off</sub> = 25				30/3.0
MMT72	10	10	30/—	0.3	10	400	10	t <sub>on</sub> = 20, t <sub>off</sub> = 30				10/3.0
PNP												
MMT3546	12	10	30/—	0.15	10	700	10	10	15	20	15	50/5.0
MMT73	3.0	10	30/—	0.2	10	400	10	t <sub>on</sub> = 30, t <sub>off</sub> = 30				10/1.0

TABLE III – HIGH-SPEED NON-SATURATED SWITCHING TRANSISTORS

Case 28 (1)

Device Type	V <sub>CE0</sub> Volts Max	Collector Test Current for Optimum h <sub>FE</sub>  I <sub>C</sub> in mA	h <sub>FE</sub>  Min/Max	V <sub>CE(sat)</sub> @ I <sub>C</sub>		f <sub>T</sub> @ I <sub>C</sub>		Switching Times ns (Typ) @ I <sub>C</sub>				
				Volts Max	mA	MHz Min	mA	t <sub>d</sub>	t <sub>r</sub>	t <sub>s</sub>	t <sub>f</sub>	mA
				NPN								
MMT3960A	8.0	10	30/200	0.2	10	1600	30	1.0	0.75	1.1	0.85	20
MMT3960	3.0	10	100/200	0.2	10	1600	30	—	0.65	—	0.75	—
MMT806	5.0	0.1	50/—	100	0.1	1200	1.0	1.0	1.5	1.0	2.0	1.0
PNP												
MMT808	5.0	0.1	50/—	100	0.1	1200	1.0	1.0	1.5	1.0	2.0	1.0



## MICRO-T TRANSISTORS AND DIODES (continued)

TABLE IV – LOW NOISE AMPLIFIER TRANSISTORS

Case 28 (1) # Case 176

Device Type	V <sub>CEO</sub> Volts Max	Collector Test Current for Optimum h <sub>FE</sub>  I <sub>C</sub> in mA	h <sub>FE</sub>  Min/Max	f <sub>T</sub> @ I <sub>C</sub>		NF @ I <sub>C</sub> and f		
				MHz Min	μA	dB Max	μA	MHz
NPN								
MMT2484	60	1.0	250/—	60	500	3.0	10	10 Hz to 10 kHz
#MMCM2484	60	1.0	250/—	60	500	3.0	—	10 Hz to 10 kHz
MMT930	45	1.0	150/—	60	500	—	—	—
#MMCM930	45	1.0	150/—	60	500	—	—	—
MMT70	20	2.0	150/—	—	—	1.0*	10	10 Hz to 15.7 kHz
PNP								
MMT3799	60	0.1	300/900	40	500	2.5	100	10 Hz to 15.7 kHz
MMT3798	60	0.1	150/450	40	500	3.5	100	10 Hz to 15.7 kHz
MMT71	20	2.0	150/—	—	—	1.5*	100	—

\*Typical

TABLE V – RF AMPLIFIER AND OSCILLATOR TRANSISTORS

Case 28 (1) # Case 176

Device Type	V <sub>CEO</sub> Volts Max	Collector Test Current for Optimum h <sub>FE</sub>		h <sub>FE</sub> Min	G <sub>p</sub> @ I <sub>C</sub> @ f			NF @ I <sub>C</sub>		f MHz	I <sub>T</sub> @ I <sub>C</sub>		Feedback Capacitance	
		I <sub>C</sub> in mA	Min		dB Typ	mA	MHz	dB Max	mA		MHz Min	mA	@ V <sub>CB</sub> = 10 Vdc	
													pF	Max
NPN														
MMT2857	15	3.0	30	18	1.5	450	3.8*	1.5	450	1000	4.0	1.0		
MMT918	15	3.0	20	23	6.0	500	6.0	1.0	60	600	10	1.7		
#MMCM918	15	3.0	20	23	6.0	500	6.0	1.0	60	600	10	1.7		
MMT8015	10	1.0	25	7.5	1.0	1000	4.0	1.0	1000	1000	6.0	—		
MMT74	12	3.0	25	14	1.5	450	4.0*	1.5	450	700	4.0	3.0		
MMT807	5.0	1.0	25	18 23	0.1 1.0	200 200	2.0*	100	—	1200	1.0	0.55**		
PNP														
MMT809	5.0	1.0	25	17 23	0.1 1.0	200 200	2.6*	100	—	1200	1.0	0.8**		

\*Typical

\*\*C<sub>ob</sub> = V<sub>CB</sub> = 0.5 Vdc

TABLE VI – N-CHANNEL JUNCTION FIELD-EFFECT TRANSISTORS

FOR RF AND MIXER APPLICATIONS

Case 28(5)

Device Type	V <sub>(BR)GSS</sub> Volts Min	I <sub>DSS</sub> mA Min/Max	C <sub>iss</sub> pF Typ	Re(y <sub>is</sub> ) μmhos Typ	NF @ f	
					T <sub>yp</sub> dB	MHz
MMT3823	-30	5.0/20	4.0	500	2.0	100

TABLE VII – SWITCHING DIODES



Device Type	V <sub>(BR)</sub> @ I <sub>(BR)</sub>		I <sub>R</sub> @ V <sub>R</sub>		V <sub>F</sub> @ I <sub>F</sub>		C <sub>e</sub> V <sub>R</sub> = 0 pF Max	t <sub>rr</sub> ns Max	Case	Description
	Volts Min	μA	μA Max	Volts	Volts Min/Max	mA				
MMD70	50	100	0.1	30	0.75/1.2	100	2.5	15	166	Single
MMD6050	70	100	0.1	50	0.55/0.7	1.0	2.0	5.0	166	Single
MMD6100	70	100	0.1	50	0.55/0.7	1.0	2.0	5.0	28 (2)	Common-Cathode
MMD6150	70	100	0.1	50	0.55/0.7	1.0	2.0	5.0	28 (3)	Common-Anode
MMD7000	70	100	0.1	50	0.55/0.7	1.0	2.0	5.0	28 (4)	Series
MMD7001	45	10	0.1	30	-1.05	300	3.5	3.2*	28 (4)	Series

\*Typical



# OPTOELECTRONICS

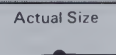





Optoelectronic devices are designed for use in computer, industrial and consumer equipment. Motorola's standard line of optoelectronic products include optical couplers, light emitters and light detectors, transistor and photo-diode arrays. Also available from Motorola are custom phototransistor and light emitting diode (LED) arrays using discrete devices mounted on printed circuit boards and custom monolithic arrays of photodiodes and photo-transistors.

Compactness, reliability and compatibility with integrated circuits keynote light emitting diode advantages — as well as perfect spectral matching of infrared (IR) units to silicon detectors. They emit infrared or visible light when forward biased. Motorola offers ten red and infrared, fast switching types for flexibility in package, performance and price.

## LIGHT EMITTING DIODES

Motorola visible red (660 nm) gallium arsenide phosphide emitters are available for use in panel and circuit

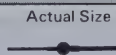





condition indicators, light modulators, alphanumeric displays and film annotation.

Package	Device Type	Peak Emission Wavelength Typ nm	Brightness Typ fL	Forward Voltage Typ Volts	Instantaneous Axial Luminous Intensity Typ mcd
Case 234-02  Actual Size	MLED50 (Clear) MLED55 (Diffusing Red)	660	750 @2mA	1.6	1.0 @ 20 mA 0.6 @ 20 mA
 CASE 81A Low Profile Lens  Actual Size	MLED610 (Clear)	660	1100 @50 mA	1.6	—
 Case 171(2)  Actual Size	MLED600 (Clear Red)	660	1100 @50 mA	1.6	—
 Case 279-01	MLED650 (Diffusing Red)	660	—	1.6	0.8 @ 20 mA

## INFRARED EMITTING DIODES

Infrared (900 nm) gallium arsenide emitters are available from Motorola for use in light modulators, shaft or position encoders, punched card and tape readers, optical

switching and logic circuits. They are spectrally matched for use with silicon detectors.



Package	Device Type	Peak Emission Wavelength Typ nm	Instantaneous Power Output Typ $\mu$ W	Forward Voltage Typ Volts
Case 234-02 Clear Plastic  Actual Size	MLED60 MLED90	900 900	550 @50 mA 350 @50 mA	1.2 1.2
 Case 171(2)  Actual Size	MLED900	900	550 @50 mA	1.2
 CASE 81A Low Profile Lens  Actual Size	MLED910	900	150 @50 mA	1.2
 Case 209-01	MLED930	900	650 @100 mA	1.2



COUPLERS

Optoelectronic couplers are gallium-arsenide LEDs optically coupled to silicon photo transistors and designed for applications requiring electrical isolation, high current transfer ratios, small package size and low cost. They

include interfacing and coupling systems, phase and feed-back controls, solid-state relays and general-purpose switching circuits. They're offered in an economical, compact, dual in-line plastic package.

Package	Type Number	DC Current Transfer Ratio % V <sub>CE</sub> = 10 V & I <sub>C</sub> = 10 mA		Inspection Voltage V <sub>dc</sub>	Switching Times = t <sub>r</sub> + t <sub>f</sub> Typ $\mu$ s	Freq. Response Typ kHz
		Min	Typ			
 Case 673-02	MOC1000	20	60	1500	5.6	300
	MOC1001	20	60	2500	5.6	300
	MOC1002	10	30	1500	5.6	300
	MOC1003	10	30	500	5.6	300
	MOC1100	100	—	1500	20	10
	MOC1200	100	100	1500	15.6	30
 Case 271-01	MOC2000	Collector Light Current V <sub>CE</sub> = 5.0 V, I <sub>F</sub> = 15 mA Min mA		1500	5.6	300
		0.5				

5

LIGHT DETECTORS



Control light generated current flow with 23 different PIN photodiodes, phototransistors and photo Darlington's for optimized optical performance in dc to high frequency designs. Sensitive, fast and rugged, Motorola detectors are also available in custom arrays of discrete devices pre-assembled and pre-tested to your specifications. Motorola phototransistors are high quality passivated Annular devices providing a high order of stability and reliability.

They are sensitive throughout the visible and near-infrared spectral range with peak sensitivity typically at a wavelength of 0.8 micrometers. Much faster than the conventional photocells or mechanical contacts, these phototransistors have rise and fall times in low microseconds when pulsed with a gallium arsenide light-emitting diode. The devices fall in two major categories, dependent on applications: (1) high density mounting (subminiature size) and (2) low density mounting (miniature size).

HIGH DENSITY NPN SILICON PHOTOTRANSISTORS

Subminiature NPN silicon phototransistors designed for use in card and tape readers, pattern and character

recognition equipment, shaft encoders, or any design requiring radiation sensitivity, stable characteristics and high density.

Package	Device Type	Sensitivity @ H = 20 mW/cm <sup>2</sup> @ H = 5.0 mW/cm <sup>2</sup> mA/mW/cm <sup>2</sup> (Note 1) Min	Light Current @ H = 20 mW/cm <sup>2</sup> Min mA	Dark Current VCC = 20 V VCC = 30 V*	Switching Time = tr+tf $\mu$ s Max	Light Current @ H = 5.0 mW/cm <sup>2</sup> (Note 1) Min mA
 CASE 173 Actual Size	MRD150	0.04	—	100	6.5	0.2
 CASE 81A Low Profile Lens Actual Size	MRD601	—	0.5	25*	4.8**	—
	MRD602	—	2.0	↓	↓	—
	MRD603	—	4.0	↓	↓	—
	MRD604	—	7.0	↓	↓	—

Note 1: H is radiation flux density emitted from a tungsten source at 2870 K.





\*\*Typ



LOW DENSITY NPN SILICON PHOTOTRANSISTORS

NPN silicon phototransistors designed for use in industrial inspection, processing and control systems, counters, sorters, switching and logic circuits or any design requiring

radiation sensitivity, stable characteristics and moderate mounting density in arrays or single device applications.

Package	Device Type	Sensitivity @ H = 5.0 mW/cm <sup>2</sup> mA/mW/cm <sup>2</sup> (Note 1) Min	Light Current @ H = 20 mW/cm <sup>2</sup> Min mA	Dark Current V <sub>CC</sub> = 20 V Max nA	Switching Time = t <sub>r</sub> +t <sub>f</sub> μs Max	Light Current @ H = 5.0 mW/cm <sup>2</sup> (Note 1) Min mA
 CASE 82-01 TO-18	MRD300	0.8	4.0	25	6.5	4.0
	MRD310	0.2	1.0	25	6.5	1.0
 Actual Size CASE 171(1)	MRD450	0.2	—	100	6.5	1.0
 CASE 210 (2)	MRD810	0.2	—	50	11	1.0
 CASE 82-01 TO-18	MRD3050	0.02	—	100	5.5**	0.1
	MRD3051	0.04	—	↓	↓	0.2
	MRD3052	0.02/0.08*	—	↓	↓	0.1/0.4*
	MRD3053	0.05/0.2*	—	↓	↓	0.25/1.0*
	MRD3054	0.125/0.5*	—	↓	↓	0.625/2.5*
	MRD3055	0.3	—	↓	↓	1.5
	MRD3056	0.4	—	↓	↓	2.0



Note 1: H is radiation flux density emitted from a tungsten source at 2870 K.

- \* Min/Max
- \*\* Typ

PIN SILICON PHOTODIODES

PIN silicon photodiodes are designed for application in laser detection, light demodulation, detection of radiation from visible and near infrared light emitting diodes, shaft or position encoders, switching and logic circuits; or any

design requiring radiation sensitivity and stable characteristics. They are extremely high speed devices with typical response time of less than 1.0 ns.


Package	Device Type	Sensitivity @H = 5.0 mW/cm <sup>2</sup> μA/mW/cm <sup>2</sup> (Note 1) Min	Dark Current V <sub>R</sub> = 20 V Max nA	Response Time Typ ns	Light Current @ H = 5.0 mW/cm <sup>2</sup> (Note 1) Min μA
 Convex Lens CASE 209-1	MRD500	1.2	2.0	1.0	6.0
 Flat glass case CASE 210-1	MRD 510	0.3	2.0	1.0	1.5

Note 1: H is radiation flux density emitted from a tungsten source at 2870 K.

SILICON PHOTO DARLINGTON AMPLIFIERS

Motorola silicon photo Darlington amplifiers are designed for use where extremely high sensitivity is required. The

TO-92 plastic side reading devices are the most economical detectors available from Motorola.

Package	Device Type	Sensitivity @ H = 2.0 mW/cm <sup>2</sup> mA/mW/cm <sup>2</sup> (Note 1) Typ	Dark Current @ H = 0 Max nA	Switching Time = t <sub>r</sub> + t <sub>f</sub> Max μs	Light Current @ H = 2.0 mW/cm <sup>2</sup> Note 1 Typ mA
 Clear Plastic CASE 29(14) TO-92	2N5777	2.0	100	400	4.0
	2N5778	2.0	↓	↓	4.0
	2N5779	4.0	↓	↓	8.0
	2N5780	4.0	↓	↓	8.0
	MRD14B	1.0	↓	↓	2.0

Note 1: H is radiation flux density emitted from a tungsten source at 2870 K.





# Chips

*For the manufacturer of hybrid circuits, a broad line of standard discrete and passive chips are now available as "off-the-shelf" products from Motorola.*

*This section includes transistors; small-signal, power, RF, and field-effect. In addition, Motorola manufactures zener diodes and tuning diodes as well as passive devices (capacitors and resistors.) For information on integrated circuit chips, see section 6 of this volume.*

*More detailed information on all devices can be found in the new Motorola Chips Data Book, which includes device selection tables, information on geometries, packaging, and inspection criteria.*

*To obtain detailed specification information on discrete device chips, see the Semiconductor Data Library, and the data sheet of the equivalent standard encapsulated device.*

*Additional digital and linear integrated circuit chip specification information can be found in the appropriate Integrated Circuit Data Books and Brochures.*



## UNENCAPSULATED SMALL-SIGNAL TRANSISTORS

... with passivated annular construction that provides high reliability and consistent performance. These transistors are listed in order of decreasing breakdown voltage ( $BV_{CEO}$ ).

SWITCHING TRANSISTORS ( $T_A = 25^\circ\text{C}$ )

Device Type	BV <sub>CEO</sub> @ I <sub>C</sub> = 10 mA Volts Min	I <sub>C</sub> Peak† mA	hFE @ I <sub>C</sub> Min/Max mA	V <sub>CE(sat)</sub> @ I <sub>C</sub> Volts Max mA	C <sub>ob</sub> pF Max	f <sub>T</sub> MHz	t <sub>d</sub> , t <sub>r</sub> * t <sub>on</sub> ns Max	t <sub>s</sub> , t <sub>f</sub> * t <sub>off</sub> ns Max		
NPN										
MMCS3507	50	3000	30/150	1500	1.0	1500	40	50	18,40	65,40
MMCS3725	50	1000	60/150	100	0.42	500	10	200	45*	75*
MMCS3444	50	1000	20/60	500	0.6	500	12	150	18,40	50,35
MMCS3506	40	3000	40/200	1500	1.0	1500	40	50	18,40	65,40
MMCS3253	40	1000	25/75	500	0.6	500	12	150	18,40	50,35
MMCS3724	30	1000	60/150	100	0.42	500	12	200	45*	75*
MMCS3252	30	1000	30/90	500	0.5	500	12	180	18,35	50,35
MMCS3227	20	500†	100/300	10	0.25	10	4.0	500	15*	20*
MMCS2369A	15	500†	40/120	10	0.25	10	4.0	500	15*	20*
MMCS2369	15	200	30/-	30	0.2	10	4.0	500	14*	20*
MMCS3959	12	30	40/200	10	0.2	1.0	2.5	1100	2.4, 3.0(1)	1.6, 3.3(1)
MMCS709	6.0	100	20/200	10	0.35	3.0	3.0	500	18*	18*

**PNP**

MMCS3763	60	1500	20/80	1000	0.9	1000	18	120	10,40	95,40
MMCS3468	50	1000	25/75	500	0.6	500	25	140	10,30	80,30
MMCS3762	40	1500	30/120	1000	0.9	1000	18	150	10,40	95,40
MMCS3467	40	1000	40/120	500	0.5	500	25	160	10,30	80,30
MMCS4260	15	30	30/150	10	0.35	10	2.5	1000	1.0, 0.5(1)	1.0, 1.0(1)
MMCS2894	12	200	40/150	30	0.2	30	6.0	320	70*	100*
MMCS3546	12	200	30/120	10	0.15	10	6.0	700	48*	35*

## SWITCHING AND AMPLIFIER TRANSISTORS

Device Type	$BV_{CEO}$ @ $I_C$ Volts Min	$I_C$ mA	$I_C$ mA	$h_{FE}$ @ $I_C$ Min/Max	$I_C$ mA	$V_{CE(sat)}$ @ $I_C$ Volts Max	$I_C$ mA	$f_T$ MHz	$t_d, t_r$ $t_{on}^*$ ns Max	$t_s, t_f$ $t_{off}^*$ ns Max
NPN										
MMCS3500(1)	150	10	300	40/120	150	0.4	150	150	20,35	300,80
MMCS3501(1)	150	10	300	100/300	150	0.4	150	150	20,35	300,80
MMCS3498(1)	100	10	500	40/120	150	0.6	300	150	30,35	300,80
MMCS3499(1)	100	10	500	100/300	150	0.6	300	150	20,35	300,80
MMCS2193	50	25	1000	40/120	150	0.35	150	40	—,85	180,60
MMCS2192	40	25	1000	100/300	150	0.35	150	40	—,85	180,60
MMCS2221A	40	10	800	40/120	150	0.3	150	250	26*(1)	70*(1)
MMCS2222A	40	10	800	100/300	150	0.3	150	250	26*(1)	70*(1)
MMCS3903	40	10	200	50/150	10	0.2	10	200	40,40	200,60
MMCS3904	40	1.0	200	100/300	10	0.2	10	250	40,40	240,60
MMCS4400	40	1.0	600	50/150	150	0.4	150	180	18,25	260,35
MMCS4401	40	1.0	600	100/300	150	0.4	150	230	18,25	260,35
MMCS2221	30	10	800	40/120	150	0.4	150	100	26*(1)	70*(1)
MMCS2222	30	10	800	100/300	150	0.4	150	100	26*(1)	70*(1)

\* AC parameter values are as specified in the standard 2N data sheets. (encapsulated devices)

(1) Typical Switching Times



SILICON AMPLIFIER TRANSISTORS (T<sub>A</sub> = 25°C)

Device Type	BV <sub>CEO</sub> @ Volts Min	I <sub>C</sub> mA	I <sub>C</sub> mA	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> μA mA*	C <sub>ob</sub> pF Max	NF dB Max	f Hz	f <sub>T</sub> MHz
NPN									
MMCS910	60	30	—	75/—	10*	15	14	1 K	50
MMCS2483	60	10	50	75/—	100	6.0	5.0	10-15.7 K	60
MMCS2484	60	10	50	175/—	100	6.0	4.0	10-15.7 K	60
MMCS929	45	10	30	60/—	500	8.0	5.0	10-15.7 K	30
MMCS930	45	10	30	150/—	500	8.0	4.0	10-15.7 K	30
MMCS5088	30	1.0	50	300/900	100	—	4.0	10-15.7 K	40
MMCS918	15	3.0	50	20/—	3.0*	1.7	6.5	60 M	600
PNP									
MMCS3798	60	10	50	150/450	500	4.0	1.0 typ	1 K	24
MMCS3799	60	10	50	300/900	500	4.0	0.8 typ	1 K	24
MMCS5087	30	1.0	50	250/800	100	4.0	3.0	10-15.7 K	32

These devices are passivated silicon high-frequency RF transistor chips and are listed in order of decreasing breakdown voltage (BV<sub>CEO</sub>).

RF TRANSISTORS (T<sub>A</sub> = 25°C)

Device Type	BV <sub>CEO</sub> @ Volts Min	I <sub>C</sub> mA	G <sub>pe</sub> @ dB Typ	f MHz	P <sub>out</sub> P <sub>out(osc)</sub> * Watt Typ	P <sub>in</sub> & Watt	V <sub>CE</sub> & Volts	f MHz	NF @ dB Typ	f MHz	h <sub>FE</sub> @ Min/Max	I <sub>C</sub> mA	f <sub>T</sub> MHz Typ Min **
NPN													
MMCS5636	35	200	7.0	400	8.4	2.0	28	400	—	—	5.0/—	200	—
MMCS3866	30	5.0	11	400	1.3	0.1	28	400	—	—	10/200	50	800
MMCS0172	30	5.0	11.4	200	—	—	—	—	2.7	200	30/—	50	1500
MMCS2857	15	3.0	15	450	0.035*	—	10	500	4.0	450	30/150	3.0	1500
MMCS0159	10	1.0	—	—	—	—	—	—	—	—	25/200	25	2000
PNP													
MMCS5160	40	5.0	8.0	400	1.2	0.16	28	400	—	—	10/—	50	400 **
MMCS4957	30	10	18	450	—	—	—	—	3.2	450	20/—	2.0	1000 **
MMCS5583	30	10	—	—	—	—	—	—	—	—	25/—	100	1000 **

\* AC parameter values are as specified in the standard 2N or MM data sheets (encapsulated devices).

These devices are passivated Field-Effect transistor chips and are listed in order of decreasing breakdown voltage (V<sub>BR(DSS)</sub> or V<sub>BR(GSS)</sub>).

FIELD-EFFECT TRANSISTORS (T<sub>A</sub> = 25°C)

MOS FETS

Device Type	V <sub>GS(th)</sub> Volts Min/Max	V <sub>BR(DSS)</sub> Volts Min	I <sub>DSS</sub> nA Max	r <sub>ds(on)</sub> Ohms Max	t <sub>d</sub> , t <sub>r</sub> ns Max	t <sub>s</sub> , t <sub>f</sub> ns Max
N-Channel						
MMCS0122	1.0/5.0	25	10	300	45,65	60,100
P-Channel						
MMCS0123	-1.0/-5.0	-25	-10	600	45,65	60,1000

JUNCTION FETS

Device Type	V <sub>BR(GSS)</sub> Volts Min	I <sub>DSS</sub> mA Min/Max	C <sub>rss</sub> pF Max	r <sub>DS(on)</sub> Ohms Max
N-Channel				
MMCS0134	30	8.0/—	5.0	100
MMCS0130	-25	2.0/20	3.0	—
MMCS0131	-25	1.0/16	3.0	—
P-Channel				
MMCS0125	40	0.5/14	2.0	—



UNENCAPSULATED SILICON POWER TRANSISTORS

*The tables on the following pages provide listings of standard Motorola power transistor chips. These chips have the same electrical characteristics as their packaged component equivalents. In a few instances, the unencapsulated chips are not sold as packaged units. For these exceptions, tables with major electrical characteristics are provided in this section.*

The Motorola power chip family features:

- Broad selection of silicon power devices, including both passivated and mesa construction.
- Power Darlington transistor chips;
- Quality assurance that is associated with devices taken from the standard Motorola high-volume power transistor production lines;
- Guaranteed specifications and detailed physical description of chip size, bonding areas and other pertinent design data.

ORDERING INFORMATION

Due to the various chip options available, the following are to be used in specifying mounting options.

1. Chip
2. Chip on Button
3. Chip on Button with Wires
4. Power Pill

To order specific die backing options use the following letter:

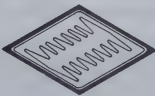
- A. Chrome-Silver
- B. Gold

Note (1) The available chip mounting and backing options are shown preceeding the tables.

Note (2) The type numbers are identified as MJC numbers.

Dimensions Include thick ness of Die

1. Chip



2. Chip on Button



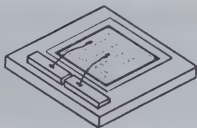
Diameter of button – 330 mils  
Height of button – 75 mils

3. Chip on Button with Wires



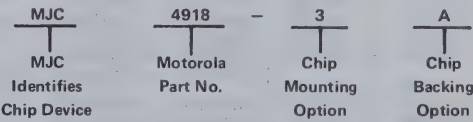
Add 25 mils for chip  
and wires

4. Power Pill



375 mils square  
100 mils thick (includes  
wire and isolation pads)

The following diagram explains the method used for ordering specific power transistor chips.



HANDLING PRECAUTIONS

Although the care and handling of unencapsulated semiconductors often require precautions outside the experience of many equipment manufacturers, Motorola warrants that such devices meet or exceed the published specifications, provided these basic requirements are met in the customer's establishment.

1. Such devices are stored in an environment of no more than 30% relative humidity.
2. Devices are die-and-wire bonded in an inert atmosphere not exceeding 400°C.
3. Processing equipment conforms to the minimum standards of equipment normally employed in semiconductor establishments.

4. Mesa Types — Mesa transistor chips have exposed collector-base junctions, therefore, it is important that the following procedures be implemented:

- a. Properly clean the die, prior to encapsulation, i.e., ultrasonic cleaning in a solvent such as Xylene or Trichloroethylene.
- b. Completely coat the exposed junction area with Dow Corning 997 or equivalent semiconductor coating.

Motorola's engineering staff is available for consultation in the event of correlation or processing problems encountered in the use of Motorola semiconductor chips. For assistance of this nature, please contact your nearest Motorola sales representative.



# **HIGH-CURRENT PASSIVATED POWER TRANSISTORS** (Gold-Backed Transistor Chip)

Motorola's passivated transistors have excellent high-speed characteristics which make these devices particularly well suited for switching and high-frequency amplifier applications. They also are used in low-frequency amplifier applications where moderate Safe Operating Area can be tolerated. Passivated transistor chips are especially useful in hybrid circuits because they require fewer handling, cleaning and protective precautions than Mesa-type transistors.

These devices listed below are available in the following mounting styles unless otherwise noted:

1. unmounted chip (\* Indicates availability in unmounted chip style only)
2. chip mounted on button
3. chip on button with wires
4. power pill

These devices are all gold backed except **BOLD FACE** type indicates availability with chrome-silver backing also.

Within each table, the transistors are listed in increasing order of current. For detailed specifications, see the Motorola data sheet of the equivalent standard encapsulated device.

NPN		PNP		I <sub>C</sub> Amp Max	NPN		Chip Type	Standard Device Type	I <sub>C</sub> Amp Max
Chip Type	Standard Device Type	Chip Type	Standard Device Type		Chip Type	Standard Device Type			
MJC5681	2N5681	MJC5679	2N5679	1.0	MJC5336	2N5336	MJC6190	2N6190	5.0
MJC5682	2N5682	MJC5680	2N5680	1.0	MJC5337	2N5337	MJC6191	2N6191	↓
		MJC3021	2N3021	3.0	MJC5338	2N5338	MJC6192	2N6192	
		MJC3024	2N3024		MJC5339	2N5339	MJC6193	2N6193	7.0
MJC4237	2N4237	MJC3719	2N3719				MJC500	MJ500	↓
		MJC4234	2N4234				MJC6700	MJ6700	
		MJC3867	2N3867				MJC501	MJ501	↓
		MJC3022	2N3022				MJC6701	MJ6701	
		MJC3025	2N3025		MJC5427	2N5427			↓
		MJC3720	2N3720		MJC5428	2N5428			
MJC4238	2N4238	MJC3023	2N3023		MJC5429	2N5429			↓
MJC5334	2N5334	MJC4235	2N4235		MJC5430	2N5430			
					MJC3445	2N3445			↓
MJC180	MJE180	MJC3868	2N3868		MJC3447	2N3447			
		MJC170	MJE170		MJC3446	2N3446			↓
		MJC3026	2N3026		MJC3448	2N3448			
MJC4239	2N4239	MJC4236	2N4236		MJC5477	2N5477	MJC6182	2N6182	10
MJC5335	2N5335				MJC5346	2N5346	MJC6186	2N6186	↓
					MJC5478	2N5478	MJC6183	2N6183	
MJC181	MJE181	MJC6303	2N6303	4.0	MJC5347	2N5347	MJC6187	2N6187	↓
MJC182	MJE182	MJC171	MJE171		MJC5479	2N5479	MJC6184	2N6184	
MJC220	MJE220	MJC230	MJE230		MJC5348	2N5348	MJC6188	2N6188	↓
MJC221	MJE221	MJC231	MJE231		MJC5480	2N5480	MJC6185	2N6185	
MJC222	MJE222	MJC232	MJE232		MJC5349	2N5349	MJC6189	2N6189	↓
		MJC3740	2N3740		MJC6338	2N6338			
MJC4788	2N4788				MJC6339	2N6339			↓
MJC223	MJE223	MJC233	MJE233		MJC6340	2N6340			
MJC224	MJE224	MJC234	MJE234		MJC6341	2N6341			↓
MJC225	MJE225	MJC235	MJE235		*MJC7000	MJ7000			
MJC3766	2N3766				*MJC6274	2N6274			30
MJC240	MJE240	MJC250	MJE250		*MJC6278	2N6278			50
		MJC3741	2N3741		*MJC6275	2N6275			↓
MJC241	MJE241	MJC251	MJE251		*MJC6279	2N6279			
MJC242	MJE242	MJC252	MJE252		*MJC6276	2N6276			↓
MJC3767	2N3767				*MJC6280	2N6280			
MJC243	MJE243	MJC253	MJE253		*MJC6277	2N6277			↓
MJC244	MJE244	MJC254	MJE254		*MJC6281	2N6281			
MJC200	MJE200	MJC210	MJE210	5.0	*MJC7200	MJ7200			↓
		MJC8100	MJ8100		*MJC7201	MJ7201			
		MJC8101	MJ8101	↓					60
									60

The following devices are available in chip form only.

NPN		PNP		ELECTRICAL CHARACTERISTICS											
Chip Type	Standard Device Type	Chip Type	Standard Device Type	I <sub>C</sub> Amp Max	V <sub>CB0</sub> Volts	V <sub>CE0</sub> Volts	h <sub>FE</sub> @ Min	I <sub>C</sub> Amp	h <sub>FE</sub> @ Min	I <sub>C</sub> Amp	V <sub>CE(sat)</sub> Volts Max	@ I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> Watts	
MJC044	MJ440	MJC043	MJ430	1.0	60	60	30	0.25	—	—	1.0	1.0	3.0	—	
MJC440		MJC430		3.0	40	40	25	0.25	20	0.5	0.5	0.75	3.0	6.0	
MJC076		MJC007		3.0	50	50	20	0.18	—	—	1.0	1.5	30	—	
		MJC3740A		2N3740A	4.0	60	60	30	0.25	10	1.0	0.6	1.0	4.0	25
		MJC3741A		2N3741A	4.0	80	80	30	0.25	10	1.0	0.6	1.0	4.0	25
MJC082		MJC067		5.0	60	60	30	2.0	—	—	2.0	5.0	30	—	
*MJC070		MJC069		25	60	60	20	10	—	—	3.0	25	30	—	



HIGH-VOLTAGE PASSIVATED POWER TRANSISTORS

The devices listed below are available in the following mounting styles:

- 1. unmounted chip
- 2. chip mounted on button
- 3. chip on button with wires

4. power pill

These devices are all gold-backed except BOLD FACE type indicates chrome-silver backing only.

Within each table, the transistors are listed in increasing order of current. For detailed specifications see the Motorola data sheet of the equivalent standard encapsulated device.

NPN			NPN		
Chip Type	Standard Device Type	I <sub>C</sub> Amp Max	Chip Type	Standard Device Type	I <sub>C</sub> Amp Max
MJC420	MJ420	0.1	MJC345	MJE345	0.5
MJC421	MJ421	0.1	MJC5657	2N5657	0.5
MJC3440	MJE3440	0.3	MJC3440	2N3440	1.0
MJC3439	MJE3439	0.3	MJC3439	2N3439	1.0
MJC341	MJE341	0.5	MJC2160	MJE2160	1.5
MJC344	MJE344	↓	MJC3738	2N3738	3.0
MJC5655	2N5655		MJC3739	2N3739	3.0
MJC2251	MJ2251		MJC6233	2N6233	5.0
MJC2252	MJ2252		MJC6234	2N6234	5.0
MJC340	MJE340		MJC6235	2N6235	5.0
MJC5656	2N5656				

The following devices are available in chip form only.

PNP		ELECTRICAL CHARACTERISTICS										
Chip Type	Standard Device Type	I <sub>C</sub> Amp Max	V <sub>CB0</sub> Volts	V <sub>CEO</sub> Volts	h <sub>FE</sub> @ I <sub>C</sub>		h <sub>FE</sub> @ I <sub>C</sub>		V <sub>CE(sat)</sub> @ I <sub>C</sub>		f <sub>T</sub> MHz Min	P <sub>D</sub> Watts
					Min	Amp	Min	Amp	Volts Max	Amp		
MJC350	MJE350	0.5	300	300	30	0.05	—	—	—	—	—	—

DARLINGTON POWER TRANSISTORS (Mesa)  
(Chrome-Silver Backed Transistor Chip)

Motorola Darlington devices consist of a driver and output transistor interconnected, with two resistors to form a high-gain monolithic circuit. Utilizing the epitaxial-base process, the devices listed below provide excellent Safe Operating Area and both NPN and PNP polarity. Because the collector-base junctions of these transistor chips are not passivated, careful handling and cleaning

precautions must be followed.

The devices listed below are available in the following mounting styles:

- 1. unmounted chip
- 2. chip mounted on button
- 3. chip on button with wires
- 4. power pill

Within each table, the transistors are listed in increasing order of current. For detailed specifications see the Motorola data sheet of the equivalent standard encapsulated device.

NPN		PNP		I <sub>C</sub> Amp Max	NPN		PNP		I <sub>C</sub> Amp Max
Chip Type	Standard Device Type	Chip Type	Standard Device Type		Chip Type	Standard Device Type	Chip Type	Standard Device Type	
MJC800	MJE800	MJC700	MJE700	4.0	MJC6301	2N6301	MJC6299	2N6299	8.0
MJC801	MJE801	MJC701	MJE701	↓	MJC6056	2N6056	MJC6054	2N6054	↓
MJC6294	2N6294	MJC6296	2N6296		MJC1001	MJ1001	MJC901	MJ901	10
MJC4000	MJ4000	MJC4010	MJ4010		MJC3000	MJ3000	MJC2500	MJ2500	10
MJC802	MJE802	MJC702	MJE702		MJC3001	MJ3001	MJC2501	MJ2501	10
MJC803	MJE803	MJC703	MJE703		MJC6057	2N6057	MJC6050	2N6050	12
MJC6295	2N6295	MJC6297	2N6297	5.0	MJC6058	2N6058	MJC6051	2N6051	12
MJC4001	MJ4001	MJC4011	MJ4011	↓	MJC6059	2N6059	MJC6052	2N6052	12
MJC1100	MJE1100	MJC1090	MJE1090		MJC4033	MJ4033	MJC4030	MJ4030	16
MJC1101	MJE1101	MJC1091	MJE1091		MJC4034	MJ4034	MJC4031	MJ4031	16
MJC1102	MJE1102	MJC1092	MJE1092		MJC4035	MJ4035	MJC4032	MJ4032	16
MJC1103	MJE1103	MJC1093	MJE1093		MJC6282	2N6282	MJC6285	2N6285	20
MJC6300	2N6300	MJC6298	2N6298	8.0	MJC6283	2N6283	MJC6286	2N6286	20
MJC6055	2N6055	MJC6053	2N6053	↓	MJC6284	2N6284	MJC6287	2N6287	20
MJC1000	MJ1000	MJC900	MJ900						



MESA POWER TRANSISTORS  
(Chrome-Silver Backed Transistor Chip)

Mesa transistor chips are constructed by the Epi-Base process and provide the best combination of ruggedness, low saturation voltages and frequency response (good switching) of any process in the industry. Transistors constructed by this process are well suited for amplifier and medium-speed switching applications. Because the collector-base junctions of these transistor chips are not passivated, careful handling and cleaning precautions must be followed (see Handling Precautions).

The devices listed below are available in the following mounting styles unless otherwise noted:

1. unmounted chip (\*Indicates availability in unmounted chip style only.)
2. chip mounted on button
3. chip on button with wires
4. power pill

These devices are all chrome-silver backed except **BOLD** FACE type indicates availability in gold backing also.

Within each table the transistors are listed in increasing order of current. For detailed specifications see the Motorola data sheet of the equivalent standard encapsulated device.

NPN		PNP		I <sub>C</sub> Amp Max	NPN		PNP		I <sub>C</sub> Amp Max
Chip Type	Standard Device Type	Chip Type	Standard Device Type		Chip Type	Standard Device Type	Chip Type	Standard Device Type	
MJC4910	2N4910	MJC4898	2N4898	1.0	MJC5985	2N5985	MJC5982	2N5982	8.0
MJC4921	2N4921	MJC4918	2N4918	↓	MJC2840	MJ2840	MJC2940	MJ2940	10
MJC4911	2N4911	MJC4899	2N4899		MJC5877	2N5877	MJC5875	2N5875	↓
MJC4922	2N4922	MJC4919	2N4919		MJC2801	MJE2801	MJC2901	MJE2901	
MJC4912	2N4912	MJC4900	2N4900		MJC3713	2N3713	MJC3789	2N3789	
MJC4923	2N4923	MJC4920	2N4920	2.0	MJC3715	2N3715	MJC3791	2N3791	↓
MJC2249	MJ2249	MJC2253	MJ2253	2.0	MJC2841	MJ2841	MJC2941	MJ2941	
MJC2250	MJ2250	MJC2254	MJ2254	2.0	MJC5878	2N5878	MJC5876	2N5876	
MJC520	MJE520	MJC370	MJE370	3.0	MJC3714	2N3714	MJC3790	2N3790	
MJC5190	2N5190	MJC5193	2N5193	4.0	MJC3716	2N3716	MJC3792	2N3792	↓
MJC480	MJ480	MJC490	MJ490	↓	MJC5632	2N5632	MJC6229	2N6229	
MJC521	MJE521	MJC371	MJE371		MJC5633	2N5633	MJC6230	2N6230	
MJC5191	2N5191	MJC5194	2N5194		MJC5634	2N5634	MJC6231	2N6231	
MJC481	MJ481	MJC491	MJ491		MJC5989	2N5989	MJC5986	2N5986	12
MJC5192	2N5192	MJC5195	2N5195	↓	MJC5990	2N5990	MJC5987	2N5987	12
MJC3054A	2N3054A	MJC6049	2N6049		MJC5991	2N5991	MJC5988	2N5988	12
MJC5067	2N5067	MJC4901	2N4901		MJC1660	MJE1660	MJC1290	MJE1290	15
MJC4913	2N4913	MJC4904	2N4904		MJC1661	MJE1661	MJC1291	MJE1291	↓
MJC4231A	2N4231			↓	MJC5881	2N5881	MJC5879	2N5879	
MJC5068	2N5068	MJC4902	2N4902		MJC5882	2N5882	MJC5880	2N5880	
MJC5869	2N5869	MJC5867	2N5867		MJC3055	MJE3055	MJC2955	MJC2955	
MJC5977	2N5977	MJC5974	2N5974	↓	MJC3055A	2N3055	MJC2955A	MJ2955	↓
MJC4914	2N4914	MJC4905	2N4905		MJC5629	2N5629	MJC6029	2N6029	
MJC4232A	2N4232				MJC5630	2N5630	MJC6030	2N6030	
MJC5978	2N5978	MJC5975	2N5975		MJC5631	2N5631	MJC6031	2N6031	16
MJC5069	2N5069	MJC4903	2N4903	↓	MJC5303	2N5303	MJC5745	2N5745	20
MJC5870	2N5870	MJC5868	2N5868		MJC3772	MJ3772			20
MJC4915	2N4915	MJC4906	2N4906		MJC5885	2N5885	MJC5883	2N5883	25
MJC4233A	2N4233				MJC5886	2N5886	MJC5884	2N5884	25
MJC5979	2N5979	MJC5976	2N5976	↓	MJC5301	2N5301	MJC4398	2N4398	30
MJC205	MJE205	MJC105	MJE105		MJC3771	MJ3771			↓
MJC5758	2N5758	MJC6226	2N6226		MJC5302	2N5302	MJC4399	2N4399	
MJC5759	2N5759	MJC6227	2N6227		MJC802A	MJ802	MJC4502	MJ4502	
MJC5760	2N5760	MJC6228	2N6228	↓	*MJC5685	2N5685	MJC5683	2N5683	50
MJC5983	2N5983	MJC5980	2N5980		*MJC5686	2N5686	MJC5684	2N5684	50
MJC5984	2N5984	MJC5981	2N5981	8.0					

The following devices are available in chip form only.

NPN		PNP		ELECTRICAL CHARACTERISTICS										
Chip Type	Standard Device Type	Chip Type	Standard Device Type	I <sub>C</sub> Amp Max	V <sub>CB0</sub> Volts	V <sub>CE0</sub> Volts	hFE @ I <sub>C</sub> Min	hFE @ I <sub>C</sub> Amp	hFE @ I <sub>C</sub> Min	hFE @ I <sub>C</sub> Amp	V <sub>CE(sat)</sub> @ I <sub>C</sub> Volts Max	I <sub>C</sub> Amp	f <sub>T</sub> MHz Min	P <sub>D</sub> Watts
MJC488	MJE488	MJC6212	2N6212	4.0	60	50	25	1.5	—	—	0.5	1.0	4.0	40
MJC2055	MJE2055			5.0	50	40	25	1.5	10	3.0	0.7	1.5	4.0	75
				5.0	70	60	20	4.0	—	—	1.1	4.0	2.0	75
			MJC6213	2N6213	5.0	70	60	25	1.5	10	3.0	0.7	1.5	4.0
		MJC6214	2N6214	5.0	90	80	25	1.5	10	3.0	0.7	1.5	4.0	75
MJC2802	MJ2802	MJC2902	MJ2902	15	70	60	15	8.0	—	—	1.5	8.0	—	117



MULTI-TAP THIN-FILM RESISTOR CHIPS

MMCR100 Seires

This series of multi-tap 10-percent resistor chips are designed for the manufacturer of hybrid circuits. These chips have gold-alloy backing that is suitable for eutectic bonding directly to a metallized substrate; or may be bonded to a kovar or ceramic tab and then attached to the substrate using epoxy adhesive or other suitable methods. Electrical connection from the aluminum bonding pads of the resistor chip to other circuit elements is accomplished using conventional wiring bonding techniques.

CONSTRUCTION DETAILS

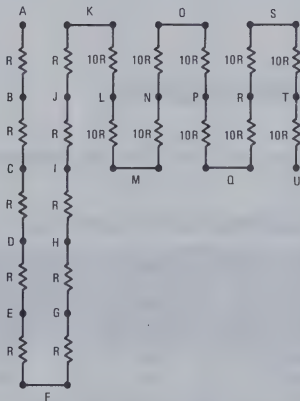
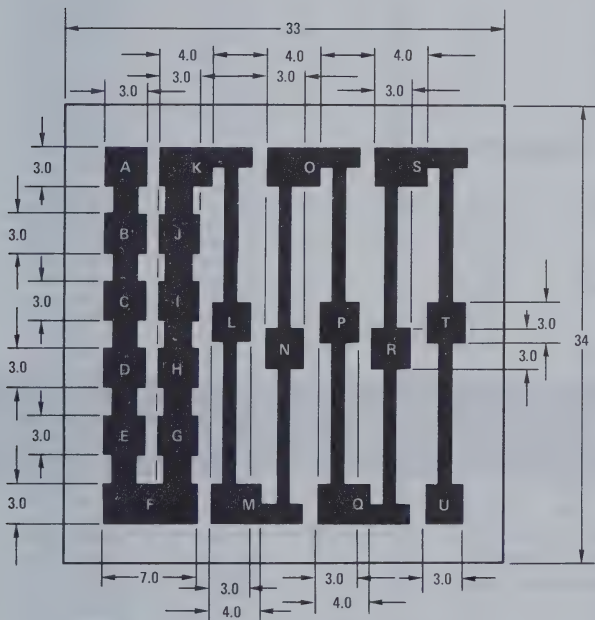
SUBSTRATE – N-TYPE SILICON – 3 to 8 MILS THICK  
ISOLATION LAYER – 10,000 Å SILICON DIOXIDE

CONTACT METALIZATION – ALUMINUM  
BACKING – GOLD-ALLOY

RESISTOR ELEMENTS – NICKLE-CHROMIUM ALLOY

All dimensions are in mils

CHIP GEOMETRY



TYPE DESIGNATION

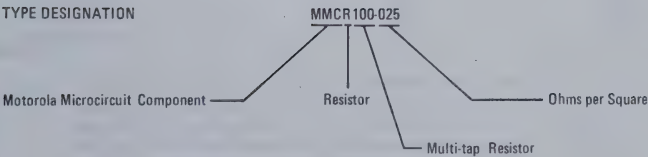


TABLE 1 RESISTANCE VALUES

PART NUMBER	OHMS/□	END-TO-END RESISTANCE
MMCR100-025	25	2,750 Ohms
MMCR100-050	50	5,500 Ohms
MMCR100-100	100	11,000 Ohms
MMCR100-200	200	22,000 Ohms
MMCR100-300	300	33,000 Ohms

Each resistor chip is divided into 10 sections of 1 square, and 10 sections of 10 squares.



PASSIVE COMPONENTS

CAPACITORS

... designed for the manufacturer of hybrid circuits. These chips are particularly useful for trimming production circuits and for building prototype circuits.

THIN-FILM CAPACITORS

Device Type	Device Type	Capacity	Breakdown Voltage	Comments
MMCQ100-330	MMCQ100-330-1	33 pF	100 Vdc	Thin film capacitor chips for use for trimming production circuits and for building prototype circuits.
MMCQ100-390	MMCQ100-390-1	39 pF	100 Vdc	
MMCQ100-470	MMCQ100-470-1	47 pF	95 Vdc	
MMCQ100-560	MMCQ100-560-1	56 pF	90 Vdc	
MMCQ100-680	MMCQ100-680-1	68 pF	85 Vdc	
MMCQ100-820	MMCQ100-820-1	82 pF	80 Vdc	
MMCQ100-101	MMCQ100-101-1	100 pF	75 Vdc	
MMCQ100-121	MMCQ100-121-1	120 pF	65 Vdc	
MMCQ100-151	MMCQ100-151-1	150 pF	50 Vdc	
MMCQ100-181	MMCQ100-181-1	180 pF	40 Vdc	
MMCQ100-221	MMCQ100-221-1	220 pF	20 Vdc	
MMCQ101	MMCQ101-1	1.0 to 31 pF	100 Vdc	

DIODES

SWITCHING DIODES

... designed for use in high-speed switching applications.

HIGH-SPEED SWITCHING DIODES (T<sub>A</sub> = 25°C)

Device Type	V <sub>(BR)</sub> @ I <sub>(BR)</sub> = 100 μA Volts Min	I <sub>R</sub> @ V <sub>R</sub> μA Max	V <sub>R</sub> Volts	I <sub>R</sub> @ V <sub>R</sub> nA Max	V <sub>R</sub> Volts	V <sub>F</sub> @ I <sub>F</sub> = 10 mA Min/Max	C @ V <sub>R</sub> = 0 pF Max
MMCD914 ①	100	5.0	75	25	20	—/1.0	4.0
MMCD6100 ②	100	5.0	100	100	50	0.65/0.85	1.5

- ① Reverse recovery time = 5.0 ns @ I<sub>F</sub> = 10 mA, V<sub>R</sub> = 6.0 V, i<sub>rr</sub> = 1.0 mA
- ② Reverse recovery time = 5.0 ns @ I<sub>F</sub> = I<sub>R</sub> = 10 mA, V<sub>R</sub> = 5.0 V, i<sub>rr</sub> = 1.0 mA



ZENER DIODE CHIPS

... for use in compact and high performance circuits that are beyond the present state of monolithic production capability.

SILICON ZENER DIODE CHIPS ( $T_A = 25^{\circ}\text{C}$  unless otherwise noted)  
 $V_F = 1.5\text{ V Max @ } I_F = 200\text{ mA}$  for all types.

Type Number (Note 1)	Nearest 1N Equivalent	Nominal Zener Voltage V <sub>Z</sub> @ I <sub>ZT</sub> = 250 μA Volts (Note 1)	Max Zener Impedance Z <sub>ZT</sub> @ I <sub>ZT</sub> = 250 μA Ohms	Max Reverse Leakage Current		
				I <sub>R</sub> μA	@ V <sub>R</sub> Volts	
					Tolerance	
					10%	5.0%
MZC1.8B10	1N4614	1.8	1200	7.5	0.9	1.0
MZC2.0B10	1N4615	2.0	1250	5.0	0.9	1.0
MZC2.2B10	1N4616	2.2	1300	4.0	0.9	1.0
MZC2.4B10	1N4617	2.4	1400	2.0	0.9	1.0
MZC2.7B10	1N4618	2.7	1500	1.0	0.9	1.0
MZC3.0B10	1N4619	3.0	1600	0.8	0.9	1.0
MZC3.3B10	1N4620	3.3	1650	7.5	1.0	1.5
MZC3.6B10	1N4621	3.6	1700	7.5	1.5	2.0
MZC3.9B10	1N4622	3.9	1650	5.0	1.5	2.0
MZC4.3B10	1N4623	4.3	1600	4.0	1.5	2.0
MZC4.7B10	1N4624	4.7	1550	10	2.5	3.0
MZC5.1B10	1N4625	5.1	1500	10	2.5	3.0
MZC5.6B10	1N4626	5.6	1400	10	3.5	4.0
MZC6.2B10	1N4627	6.2	1200	10	4.5	5.0
MZC6.8B10	1N4099	6.8	200	10	4.8	5.2
MZC7.5B10	1N4100	7.5	200	10	5.5	5.7
MZC8.2B10	1N4101	8.2	200	1.0	6.0	6.3
MZC8.7B10	1N4102	8.7	200	1.0	6.2	6.6
MZC9.1B10	1N4103	9.1	300	1.0	6.7	6.9
MZC10B10	1N4104	10	400	1.0	7.0	7.6
MZC11B10	1N4105	11	400	0.05	8.0	8.5
MZC12B10	1N4106	12	300	0.05	8.7	9.1
MZC13B10	1N4107	13	200	0.05	9.4	9.9
MZC14B10	1N4108	14	200	0.05	9.5	10.7
MZC15B10	1N4109	15	200	0.05	10.5	11.4
MZC16B10	1N4110	16	200	0.05	11.4	12.2
MZC17B10	1N4111	17	200	0.05	12.4	12.9
MZC18B10	1N4112	18	200	0.05	13.3	13.7
MZC19B10	1N4113	19	200	0.05	13.3	14.5
MZC20B10	1N4114	20	200	0.01	14.3	15.2
MZC22B10	1N4115	22	200	0.01	16.2	16.7
MZC24B10	1N4116	24	200	0.01	17.1	18.5
MZC25B10	1N4117	25	200	0.01	18.1	19.0
MZC27B10	1N4118	27	200	0.01	20	20.5
MZC28B10	1N4119	28	200	0.01	20	21.3
MZC30B10	1N4120	30	200	0.01	22	22.6
MZC33B10	1N4121	33	200	0.01	24	25.1
MZC36B10	1N4122	36	200	0.01	26	27.4
MZC39B10	1N4123	39	200	0.01	29	29.7
MZC43B10	1N4124	43	250	0.01	31	32.7
MZC47B10	1N4125	47	250	0.01	34	35.8
MZC51B10	1N4126	51	300	0.01	37	38.8
MZC56B10	1N4127	56	300	0.01	41	42.6
MZC60B10	1N4128	60	300	0.01	44	45.6
MZC62B10	1N4129	62	300	0.01	45	47.1
MZC68B10	1N4130	68	400	0.01	49	51.7
MZC75B10	1N4131	75	500	0.01	53	57.0
MZC82B10	1N4132	82	600	0.01	59	62.3
MZC87B10	1N4133	87	700	0.01	65	66.1
MZC91B10	1N4134	91	800	0.01	66	69.2
MZC100B10	1N4135	100	1000	0.01	72	76.0
MZC110B10	—	110	1300	0.01	80	84.0
MZC120B10	—	120	1600	0.01	86	91.0
MZC130B10	—	130	1900	0.01	94	99.0
MZC140B10	—	140	2200	0.01	101	106
MZC150B10	—	150	2600	0.01	108	114
MZC160B10	—	160	3000	0.01	116	122
MZC170B10	—	170	3500	0.01	123	129
MZC180B10	—	180	4000	0.01	130	137
MZC190B10	—	190	4600	0.01	137	144
MZC200B10	—	200	5200	0.01	144	152

Note 2: The MZC2.4A10 Series is tested at a 50 Milliwatt dissipation level and not at the higher test currents of the nearest "1N" equivalents. This procedure is used to minimize correlation problems encountered when probe testing. Zener voltage is guaranteed correlated when the die is mounted on a 1" x 1" x 0.010" aluminum heat sink at  $T_A = 30^{\circ}\text{C} \pm 1^{\circ}\text{C}$  after 90 seconds.



# CHIPS (continued)

## ZENER CHIPS (continued)

### SILICON ZENER DIODE CHIPS ( $T_A = 25^{\circ}\text{C}$ unless otherwise noted)

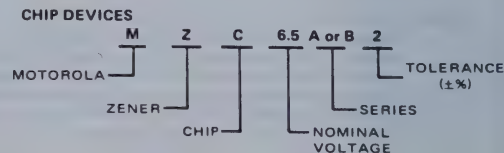
$V_F = 1.5\text{ V Max @ } I_F = 200\text{ mA}$  for all types.

Type Number (Note 1)	Nearest 1N Equivalent (Note 2)	Nominal Zener Voltage V <sub>Z</sub> @ I <sub>ZT</sub> Volts (Note 1)	Test Current I <sub>ZT</sub> mA (Note 2)	Max Zener Impedance Z <sub>ZT</sub> @ I <sub>ZT</sub> Ohms	Max Reverse Leakage Current			Max Zener Voltage Temp. Coeff. θ <sub>VZ</sub> (%/°C) (For Reference Only)
					I <sub>R</sub> μA	V <sub>R</sub> Volts		
						Tolerance		
						10%	5.0%	
MZC2.4A10	1N5221, 1N4370	2.4	21	53	100	0.95	1.0	-0.085
MZC2.5A10	1N5222	2.5	20	53	100	0.95	1.0	-0.085
MZC2.7A10	1N5223, 1N4371	2.7	19	52	75	0.95	1.0	-0.080
MZC2.8A10	1N5224	2.8	18	51	75	0.95	1.0	-0.080
MZC3.0A10	1N5225, 1N4372	3.0	17	50	50	0.95	1.0	-0.075
MZC3.3A10	1N5226, 1N746	3.3	15	47	25	0.95	1.0	-0.070
MZC3.6A10	1N5227, 1N747	3.6	14	43	15	0.95	1.0	-0.065
MZC3.9A10	1N5228, 1N748	3.9	13	35	10	0.95	1.0	-0.060
MZC4.3A10	1N5229, 1N749	4.3	12	29	5.0	0.95	1.0	±0.055
MZC4.7A10	1N5230, 1N750	4.7	11	24	5.0	1.9	2.0	±0.030
MZC5.1A10	1N5231, 1N751	5.1	9.8	21	5.0	1.9	2.0	±0.030
MZC5.6A10	1N5232, 1N752	5.6	8.9	25	5.0	2.9	3.0	±0.038
MZC6.0A10	1N5233	6.0	8.3	30	5.0	3.3	3.5	±0.038
MZC6.2A10	1N5234, 1N753	6.2	8.1	31	5.0	3.8	4.0	±0.045
MZC6.8A10	1N5235, 1N754	6.8	7.3	38	3.0	4.8	5.0	±0.050
MZC7.5A10	1N5236, 1N755	7.5	6.7	43	3.0	5.7	6.0	±0.058
MZC8.2A10	1N5237, 1N756	8.2	6.1	49	3.0	6.2	6.5	±0.062
MZC8.7A10	1N5238	8.7	5.7	52	3.0	6.2	6.5	±0.065
MZC9.1A10	1N5239, 1N757	9.1	5.5	54	3.0	6.7	7.0	±0.068
MZC10A10	1N5240, 1N758	10	5.0	60	3.0	7.6	8.0	±0.075
MZC11A10	1N5241, 1N962	11	4.5	66	2.0	8.0	8.4	±0.076
MZC12A10	1N5242, 1N759	12	4.2	71	1.0	8.7	9.1	±0.077
MZC13A10	1N5243, 1N964	13	3.8	74	0.5	9.4	9.9	±0.079
MZC14A10	1N5244	14	3.6	33	0.1	9.5	10	±0.082
MZC15A10	1N5245, 1N965	15	3.3	37	0.1	10.5	11	±0.082
MZC16A10	1N5246, 1N966	16	3.1	42	0.1	11.4	12	±0.083
MZC17A10	1N5247	17	2.9	47	0.1	12.4	13	±0.084
MZC18A10	1N5248, 1N967	18	2.8	52	0.1	13.3	14	±0.085
MZC19A10	1N5249	19	2.6	58	0.1	13.3	14	±0.086
MZC20A10	1N5250, 1N968	20	2.5	65	0.1	14.3	15	±0.086
MZC22A10	1N5251, 1N969	22	2.3	70	0.1	16.2	17	±0.087
MZC24A10	1N5252, 1N970	24	2.1	92	0.1	17.1	18	±0.088
MZC25A10	1N5253	25	2.0	100	0.1	18.1	19	±0.089
MZC27A10	1N5254, 1N971	27	1.9	115	0.1	20	21	±0.090
MZC28A10	1N5255	28	1.8	120	0.1	20	21	±0.091
MZC30A10	1N5256, 1N972	30	1.7	140	0.1	22	23	±0.091
MZC33A10	1N5257, 1N973	33	1.5	170	0.1	24	25	±0.092
MZC36A10	1N5258, 1N974	36	1.4	200	0.1	26	27	±0.093
MZC39A10	1N5259, 1N975	39	1.3	230	0.1	29	30	±0.094
MZC43A10	1N5260, 1N976	43	1.2	280	0.1	31	33	±0.095
MZC47A10	1N5261, 1N977	47	1.1	330	0.1	34	36	±0.095
MZC51A10	1N5262, 1N978	51	0.98	390	0.1	37	39	±0.096
MZC56A10	1N5263, 1N979	56	0.89	460	0.1	41	43	±0.096
MZC60A10	1N5264	60	0.83	530	0.1	44	46	±0.097
MZC62A10	1N5265, 1N980	62	0.81	560	0.1	45	47	±0.097
MZC68A10	1N5266, 1N981	68	0.74	680	0.1	49	52	±0.097
MZC75A10	1N5267, 1N982	75	0.67	800	0.1	53	56	±0.098
MZC82A10	1N5268, 1N983	82	0.61	980	0.1	59	62	±0.098
MZC87A10	1N5269	87	0.57	1050	0.1	65	68	±0.099
MZC91A10	1N5270, 1N984	91	0.55	1150	0.1	66	69	±0.099
MZC100A10	1N5271, 1N985	100	0.50	1400	0.1	72	76	±0.110
MZC110A10	1N5272, 1N986	110	0.45	1700	0.1	80	84	±0.110
MZC120A10	1N5273, 1N987	120	0.42	2000	0.1	86	91	±0.110
MZC130A10	1N5274, 1N988	130	0.38	2300	0.1	94	99	±0.110
MZC140A10	1N5275	140	0.36	2700	0.1	101	106	±0.110
MZC150A10	1N5276, 1N989	150	0.33	3000	0.1	108	114	±0.110
MZC160A10	1N5277, 1N990	160	0.31	3400	0.1	116	122	±0.110
MZC170A10	1N5278	170	0.29	3900	0.1	123	129	±0.110
MZC180A10	1N5279, 1N991	180	0.28	4300	0.1	130	137	±0.110
MZC190A10	1N5280	190	0.26	4800	0.1	137	144	±0.110
MZC200A10	1N5281, 1N992	200	0.25	5200	0.1	144	152	±0.110

#### NOTE 1 – TOLERANCE AND VOLTAGE DESIGNATION

Tolerance Designation – The device type numbers listed have a tolerance of  $\pm 10\%$ . For a  $\pm 5\%$ ,  $3\%$ ,  $2\%$ , or  $1\%$ , change the suffix "10" to the desired tolerance.

Voltage Designation – To order devices with Zener voltages other than those listed, the Motorola type number should be modified as shown below.





# INTEGRATED CIRCUITS

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Chips listed are stock chips. For availability of chips for other products, contact your Motorola sales representative.



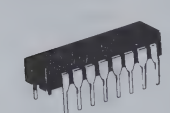
MC10,000/10,200 Series (-30 to +85°C)  
MC10,500/10,600 Series (-55 to +125°C)

MECL 10,000 is Motorola's fourth family of emitter-coupled logic. Like MECL I, II, and III, this family provides non-saturated switching for very high speed operation. The MECL 10,000 family is designed to fill the speed range between 4.0 ns MECL II and 1.0 ns MECL III.

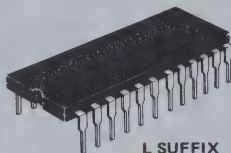
The features of MECL II and MECL III have been optimized and combined to give MECL 10,000 an excellent speed-power product, relatively slow rise and fall times, and transmission-line drive capability. The combination of

versatile logic functions and the 2.0 ns propagation delay make MECL 10,000 the optimum family for data handling and processing systems.

Circuit design with MECL 10,000 is similar to that for the MECL II and MECL III lines. The differential amplifier input and emitter-follower output permit high fanout, the wired-OR option, and complementary outputs. MECL III is directly compatible with MECL 10,000, and can be used to extend the speed capability of the MECL 10,000 series.



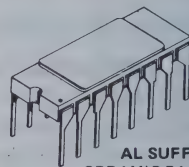
L SUFFIX  
CERAMIC PACKAGE  
CASE 620



L SUFFIX  
CERAMIC PACKAGE  
CASE 623



P SUFFIX  
PLASTIC PACKAGE  
CASE 649



AL SUFFIX  
CERAMIC PACKAGE  
CASE 690

#### FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 0$ , $V_{EE} = -5.2$ V, $T_A = 25^\circ\text{C}$ )

Function	Type ①		Propagation Delay ns typ	Power Dissipation mW typ/pkg	Case
	-30 to +85°C	-55 to +125°C			
Quad Gate	MC10101	MC10501	2.0	100	620
Quad 2-Input Gate	MC10102	MC10502	2.0	100	620
• Quad AND Gate	MC10104	—	2.7	140	620
Triple 2-3-2-Input Gate	MC10105	MC10505	2.0	75	620
Triple 4-3-3-Input Gate	MC10106	MC10506	2.0	75	620
Triple 2-Input Exclusive OR/Exclusive NOR	MC10107	MC10507	2.5	110	620
Dual 4-5-Input OR/NOR Gate	MC10109	MC10509	2.0	50	620
Dual 3-Input 3-Output OR Gate	MC10110	—	2.4	150	620
Dual 3-Input 3-Output NOR Gate	MC10111	—	2.4	150	620
• Triple Line Receiver	MC10114	—	2.4	145	620
Quad Line Receiver	MC10115	MC10515	2.0	100	620
Triple Line Receiver	MC10116	MC10516	2.0	75	620
• Dual 2-Wide 2-3-Input OR-AND/OR-AND-INVERT Gate	MC10117	MC10517	2.3	100	620
• Dual 2-Wide 3-Input OR-AND Gate	MC10118	MC10518	2.3	100	620
• 4-Wide 4-3-3-3-Input OR-AND Gate	MC10119	MC10519	2.3	100	620
4-Wide OR-AND/OR-AND-INVERT Gate	MC10121	MC10521	2.3	100	620
MTTL to MECL Translator	MC10124	—	5.0	340	620
MECL to MTTL Translator	MC10125	—	5.0	360	620
• Bus Driver	MC10128	—	12.0	700	620
• Bus Receiver	MC10129	—	10.0	725	620
Dual Latch	MC10130	—	2.5	160	620
Dual Type D Master-Slave Flip-Flop	MC10131	MC10531	f = 160 MHz	225	620
Dual Multiplexer With Latch And Common Reset	MC10132	—	3.0	225	620
Quad Latch	MC10133	—	4.0	300	620
Multiplexer with Latch	MC10134	—	3.0	225	620
Dual J-K Master-Slave Flip-Flop	MC10135	—	f = 140 MHz	250	620
• Universal Hexadecimal Counter	MC10136	—	f = 150 MHz	585	620
• Universal Decade Counter	MC10137	—	f = 150 MHz	585	620
Four-Bit Universal Shift Register	MC10141	—	f = 200 MHz	400	620
• 64-Bit Register File	MC10145	—	t <sub>Access</sub> = 10	585	620
12-Bit Parity Generator-Checker	MC10160	MC10560	4.0	320	620
Binary to 1-8 Decoder (Low)	MC10161	—	4.0	315	620
Binary to 1-8 Decoder (High)	MC10162	—	4.0	315	620
8-Line Multiplexer	MC10164	MC10564	3.0	300	620
• 8-Input Priority Encoder	MC10165	—	7.0	580	620
• Binary to 1-4 Decoder	MC10171	—	4.0	340	620
• Quad 2-Input Multiplexer/Latch	MC10173	—	2.5	260	620
Dual 4 to 1 Multiplexer	MC10174	—	3.5	325	620
• Quint Latch	MC10175	—	2.5	385	620
Look-Ahead Carry Block	MC10179	—	3.0 (C <sub>n</sub> F) 4.0 (G)	285	620
• Dual High Speed Adder/Subtractor	MC10180	—	4.5	340	620
• 4-Bit Arithmetic Logic Unit/Function Generator	MC10181	MC10581	See Logic Diag.	575	623,649
Dual 3-Input 3-Output OR Gate	MC10210	—	1.5	150	620
Dual 3-Input 3-Output NOR Gate	MC10211	—	1.5	150	620
Triple Line Receiver	MC10216	—	1.8	100	620
Dual Type D Master-Slave Flip-Flop	MC10231	MC10631	f = 225 MHz	285	620
64-Bit Random Access Memory (90 Ω)	MCM10140	—	t <sub>Access</sub> = 10	420	690
64-Bit Random Access Memory (50 Ω)	MCM10148	—	t <sub>Access</sub> = 10	420	690

① L suffix denotes Dual In-Line Ceramic Package, P suffix denotes Dual In-Line Plastic Package (i.e., MC10100L = Ceramic Dual In-Line Package and MC10100P = Plastic Dual In-Line Package).

• New Devices

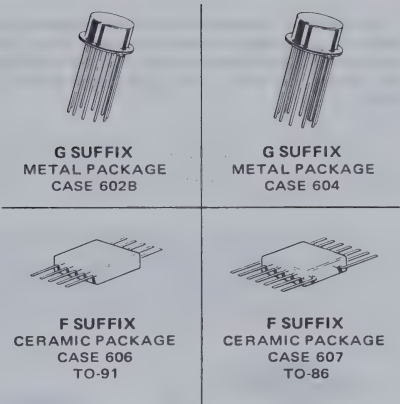


MC300 Series (−55° to +125°C)

MC350 Series (0° to +75°C)

FEATURES

- Propagation delay typically 8 ns per logic decision
- Virtually constant noise immunity with ±20% power supply variation and over corresponding temperature range
- Simultaneous OR / NOR or AND / NAND outputs
- High fan-in and fan-out capabilities



The MECL series of integrated logic circuits forms a versatile set of monolithic digital building blocks representing all the necessary circuitry for the arithmetic portion of a computer. MECL circuits combine high speed with a systems-oriented design approach that permits implementation with the fewest possible number of individual devices. This represents both a cost saving and a potential increase in system reliability. The MECL circuits in this series are compatible with higher-speed MECL lines, such as MECL II.

FUNCTIONS AND CHARACTERISTICS (V<sub>CC</sub> = 0, V<sub>EE</sub> = -5.2 V, T<sub>A</sub> = 25°C)

Function	Type ①		Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg	Case
	-55 to +125°C	0 to +75°C				
5-Input OR/NOR Gate	MC301	MC351	25	7.5	37	602B, 606
R-S Flip-Flop	MC302	MC352A	25	11	42	602B, 606
Half-Adder	MC303	MC353	25	7.5	63	602B, 606
Bias Driver	MC304	MC354	25	—	18	602B, 606
5-Input Gate Expander	MC305	MC355	—	4.5	—	602B, 606
3-Input OR/NOR Gate	MC306	MC356	25	7.5	37	602B, 606
3-Input OR/NOR Gate	MC307	MC357	25	7.5	15	602B, 606
AC-Coupled J-K Flip-Flop	MC308	MC358A	25	8.5	87	602B, 606
Dual 2-Input NOR Gate	MC309	MC359	25	7.0	54	602B, 606
Dual 2-Input NOR Gate	MC310	MC360	25	7.0	54	602B, 606
Dual 2-Input NOR Gate	MC311	MC361	25	7.0	41	602B, 606
Dual 3-Input NOR Gate (With Internal Bias)	MC312A	MC362A	25	7.5	70	602B, 606
Quad 2-Input NOR Gate	MC313F	MC363F	25	7.0	125	607
AC-Coupled J-K Flip-Flop	MC314	MC364	25	12	118	602B, 606
Line Driver	MC315	MC365	—	14	180 ②–270 ③	602B, 606
Lamp Driver	MC316	MC366	—	—	135	602B, 606
Level Translator — MECL to Saturated Logic	MC317	MC367	7 (DTL)	27.5	63	602B, 606
Level Translator — Saturated Logic to MECL	MC318	MC368	25 (MECL)	17	105	602B, 606
Dual 4-Input Clock Driver/High-Speed Gate	—	MC369F	100	3.0	250	607
Dual 2-Input Clock Driver/High-Speed Gate	—	MC369G	100	3.0	250	602B

① G suffix denotes Metal Can. F suffix denotes Flat Package. (i.e., MC301G = Metal Can, MC301F = Flat Package.)

② With 93-ohm load for MC315 (each side)

③ With 50-ohm load for MC365 (each side)



MC1000 Series (0 to +75°C)

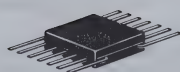
MC1200 Series (-55 to +125°C)

The MECL II series of monolithic integrated logic circuits presents the system design engineer with an integrated circuit family designed to permit system implementation with the fewest possible number of individual units. This approach offers cost savings, reduced power supply requirements, smaller physical size and high reliability.

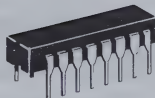
MECL II circuits feature the fastest propagation delay times with commensurate rise and fall times of any family of integrated circuits. This feature plus the constant current feature of MECL imposes fewer restrictions on design, layout and system fabrication than any other high-speed family.

## FEATURES

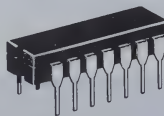
- Propagation typically 4 ns per logic decision
- Excellent noise immunity characteristics
- Simultaneous OR/NOR outputs
- High fan-in and fan-out capabilities
- Internally temperature compensated



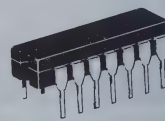
**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86



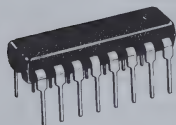
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620



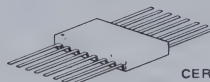
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 632  
TO-116



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 650

FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 0$ ,  $V_{EE} = -5.2$  V,  $T_A = 25^\circ\text{C}$ )

Function	Type ①		Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg	Case
	-55 to +125°C	0 to +75°C				
Single 6-Input Gate, 3 OR Outputs w/Pulldowns 3 NOR Outputs w/Pulldowns	MC1201F,L	MC1001P	25	4.0	115	607, 632, 646
Single 6-Input Gate, 3 OR Outputs w/Pulldowns 3 NOR Outputs w/o Pulldowns	MC1202F,L	MC1002P	25	4.0	80	607, 632, 646
Single 6-Input Gate, 3 OR Outputs w/o Pulldowns 3 NOR Outputs w/o Pulldowns	MC1203F,L	MC1003P	25	4.0	40	607, 632, 646
Dual 4-Input Gate, 2 OR Outputs w/Pulldowns 2 NOR Outputs w/Pulldowns	MC1204F,L	MC1004P	25	4.0	95	607, 632, 646
Dual 4-Input Gate, 2 OR Outputs w/Pulldowns 2 NOR Outputs w/o Pulldowns	MC1205F,L	MC1005P	25	4.0	65	607, 632, 646
Dual 4-Input Gate, 2 OR Outputs w/o Pulldowns 2 NOR Outputs w/o Pulldowns	MC1206F,L	MC1006P	25	4.0	45	607, 632, 646
Triple 3-Input Gate, 3 NOR Outputs w/Pulldowns	MC1207F,L	MC1007P	25	4.0	110	607, 632, 646
Triple 3-Input Gate, 1 NOR Outputs w/Pulldowns 2 NOR Outputs w/o Pulldowns	MC1208F,L	MC1008P	25	4.0	75	607, 632, 646
Triple 3-Input Gate, 3 NOR Outputs w/o Pulldowns	MC1209F,L	MC1009P	25	4.0	60	607, 632, 646
Quad 2-Input Gate, 4 NOR Outputs w/Pulldowns	MC1210F,L	MC1010P	25	4.5	115	607, 632, 646
Quad 2-Input Gate, 2 NOR Outputs w/Pulldowns 2 NOR Outputs w/o Pulldowns	MC1211F,L	MC1011P	25	4.5	95	607, 632, 646

① Type numbers with F suffix use Case 607 or 650, Type numbers with L suffix use Case 632 or 620 as indicated.

Type numbers with P suffix use Case 646 or 648 as indicated.



# MECL II (continued)

## FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 0$ , $V_{EE} = -5.2$ V, $T_A = 25^\circ\text{C}$ )

Function	Type ①		Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg	Case
	-55 to +125°C	0 to +75°C				
Quad 2-Input Gate, 4 NOR Outputs w/o Pulldowns	MC1212F,L	MC1012P	25	4.5	65	607, 632, 646
AC Coupled J-K Flip-Flop (85 MHz typ)	MC1213F,L	MC1013P	25	6.0	125	607, 632, 646
Dual R-S Flip-Flop (Positive Clock)	MC1214F,L	MC1014P	25	6.0	140	607, 632, 646
Dual R-S Flip-Flop (Negative Clock)	MC1215F,L	MC1015P	25	6.0	140	607, 632, 646
Dual R-S Flip-Flop (Single Rail)	MC1216F,L	MC1016P	25	6.0	140	607, 632, 646
Level Translator (Saturated Logic to MECL)	MC1217F,L	MC1017P	25 (MECL)	15	105	607, 632, 646
Level Translator (MECL to Saturated Logic)	MC1218F,L	MC1018P	7 (DTL)	19	55	607, 632, 646
Full Adder	MC1219F,L	MC1019P	25	3.0 to 8.0*	145	607, 632, 646
Quad Line Receiver	MC1220F,L	MC1020P	25	4.0	115	607, 632, 646
Full Subtractor	MC1221F,L	MC1021P	25	4.0 to 11*	145	607, 632, 646
Type D Flip-Flop	MC1222F,L	MC1022P	25	8.0	110	607, 632, 646
Dual 4-Input OR/NOR Clock Driver	MC1223F,L	MC1023P	25	2.0	250	607, 632, 646
Dual 2-Input Expandable Gate	MC1224F,L	MC1024P	25	4.0	95	607, 632, 646
Dual 4 and 5-Input Expander	MC1225F,L	MC1025P	—	—	—	607, 632, 646
Dual 3-4-Input Transmission Line and Clock Driver	MC1226F,L	MC1026P	25	2.0	140	607, 632, 646
AC Coupled J-K Flip-Flop (120 MHz typ)	MC1227F,L	MC1027P	25	4.0	250	607, 632, 646
Dual 4-Channel Data Selector	MC1228F,L	MC1028P	25	5.0	170	620, 648, 650
Data Distributor	MC1229F,L	MC1029P	25	4.0	160	607, 632, 646
Quad Exclusive OR Gate	MC1230F,L	MC1030P	25	5.0	130	607, 632, 646
Quad Exclusive NOR Gate	MC1231F,L	MC1031P	25	5.0	130	607, 632, 646
100-MHz AC Coupled Dual J-K Flip-Flop	MC1232F,L	MC1032P	25	4.5	180	620, 648, 650
Dual R-S Flip-Flop (Single Rail, Negative Clock)	MC1233F,L	MC1033P	25	6.0	140	607, 632, 646
Type D Flip-Flop	MC1234F,L	MC1034P	25	4.0	185	607, 632, 646
Triple Line Receiver	MC1235F,L	MC1035P	25	5.0	140	607, 632, 646
16-Bit Coincident Memory	MC1236F,L	MC1036P	5	17	250	607, 632, 646
16-Bit Coincident Memory w/o Pulldowns	MC1237F,L	MC1037P	5	17	250	607, 632, 646
8-Channel Data Selector	MC1238F,L	MC1038P	25	7.0 to 18*	150	607, 632, 646
Quad Level Translator (MECL to Saturated Logic)	MC1239F,L	MC1039P	7 (DTL)	12	200	620, 648, 650
Quad Latch	MC1240F,L	MC1040P	25	8.0	250	607, 632, 646
Dual Binary to One-Of-Four Decoder	MC1242F,L	MC1042P	25	6.5	245	620, 648, 650
3-Bit Binary to One-Of-Eight Line Decoder	MC1243F,L	MC1043P	25	6.0 to 11*	210	607, 632, 646
Binary to One-Of-Ten Line Decoder	MC1244F,L	MC1044P	25	6.0	245	620, 648, 650
Decoder - Nixie <sup>®</sup> Driver	MC1245F,L	MC1045P	—	—	178	620, 648, 650
Quad 2-Input AND Gates	MC1247F,L	MC1047P	25	5.0	130	607, 632, 646
Quad 2-Input NAND Gates	MC1248F,L	MC1048P	25	5.0	130	607, 632, 646
Dual Full Adder	MC1259F,L	MC1059P	25	9.0	375	620, 648, 650
Quad 2-Input NOR Gate	MC1262F,L	MC1062P	25	2.0	320	620, 648, 650
Quad 2-Input NOR Gate	MC1263F,L	MC1063P	25	2.0	320	632, 646
Triple Line Receiver	MC1266F,L	MC1066P	25	2.0	350	607, 632, 646
Quad MTTL to MECL Translator With Strobe	MC1267F,L	MC1067P	1	5.0	300	620, 648, 650
Quad MECL to MTTL Translator With Totem-Pole Outputs	MC1268F,L	MC1068P	10 (MTTL)	5.0	340	620, 648, 650
Quad Latch	MC1270F,L	MC1070P	25	8.0	200	607, 632, 646

① Type numbers with F suffix use Case 607 or 650, Type numbers with L suffix use Case 632 or 620 as indicated.

Type numbers with P suffix use Case 646 or 648 as indicated.

\*Propagation delay time is dependent on data path, see data sheet for details.

Nixie <sup>®</sup> is a registered trademark of Burroughs Corp.



MC1600 Series (0 to +75°C)

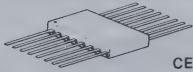
The requirement for digital systems with ever higher performance has increased the need for high-speed integrated circuits. The industry has recognized that the only economical way to obtain high operating system speed is through the use of emitter-coupled logic. As the result of considerable effort in research and development, Motorola offers a state-of-the-art, emitter-coupled logic family with

sub-nanosecond local propagation delays — MECL III.

MECL III circuit design is similar to that used in the popular MECL II and MECL 10,000 families. In the MECL III line, as well as MECL 10,000, more advanced processing techniques are employed and the capability of driving low-impedance terminated lines is provided.

## GENERAL FEATURES

- Gate Switching Speeds of 1.0 ns
- Capability of Driving Terminated Lines with Impedance as Low as 50 Ohms
- Flip-Flop Toggle and Shifting Rate Greater Than 300 MHz
- Operation with Unused Inputs Left Open
- Multilayer Metalization for Optimum Performance
- New Packages with Improved Electrical and Thermal Characteristics
- Compatibility with MECL II and MECL 10,000 Series



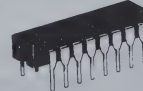
F SUFFIX  
CERAMIC PACKAGE  
CASE 650



P SUFFIX  
PLASTIC PACKAGE  
CASE 648



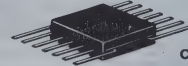
S SUFFIX  
CERAMIC PACKAGE  
CASE 617



L SUFFIX  
CERAMIC PACKAGE  
CASE 620



L SUFFIX  
CERAMIC PACKAGE  
CASE 632  
TO-116



F SUFFIX  
CERAMIC PACKAGE  
CASE 607  
TO-86

FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 0$ ,  $V_{EE} = -5.2$  V,  $T_A = 25^\circ$  unless otherwise noted)

Function	Type <sup>①</sup>	Loading Factor#		Propagation Delay	Power Dissipation (No Load)	Case
	0 to +75°C	High Z	Low Z	50-ohm Load ns typ	mW typ/pkg	
Voltage Controlled Oscillator	MC1648†	—	—	*225 MHz typ	150	607,632,646
Dual A/D Comparator	MC1650	70	7	3.5	275	617,620
Dual A/D Comparator	MC1651	70	7	2.5	275	617,620
Binary Counter (High Z)	MC1654	70	7	*325 MHz typ	750 $\lll$	620
Voltage-Controlled Multivibrator	MC1658†	70	7	*150 MHz typ	125	620,648,650
Dual 4-Input OR/NOR Gate (High Z)	MC1660†	70	7	1.1	120	617,620,650
Dual 4-Input OR/NOR Gate (Low Z)	MC1661	70	7	1.1	120	617,620
Quad 2-Input NOR Gate (High Z)	MC1662†	70	7	1.1	240	617,620,650
Quad 2-Input NOR Gate (Low Z)	MC1663	70	7	1.1	240	617,620
Quad 2-Input OR Gate (High Z)	MC1664†	70	7	1.1	240	617,620,650
Quad 2-Input OR Gate (Low Z)	MC1665	70	7	1.1	240	617,620
Dual Clocked R-S Flip-Flop (High Z)	MC1666†	70	7	1.8	220	617,620,650
Dual Clocked R-S Flip-Flop (Low Z)	MC1667	70	7	1.8	230	617,620
Dual Clocked Latch (High Z)	MC1668†	70	7	1.8	220	617,620,650
Dual Clocked Latch (Low Z)	MC1669	70	7	1.8	220	617,620
Master-Slave Type D Flip-Flop (High Z)	MC1670†	70	7	**350 MHz typ	220	617,620,650
Master-Slave Type D Flip-Flop (Low Z)	MC1671	70	7	**350 MHz typ	220	617,620
Triple 2-Input Exclusive OR Gate (High Z)	MC1672†	70	7	1.3	220	617,620,650
Triple 2-Input Exclusive OR Gate (Low Z)	MC1673	70	7	1.3	250	617,620
Triple 2-Input Exclusive NOR Gate (High Z)	MC1674†	70	7	1.3	220	617,620,650
Triple 2-Input Exclusive NOR Gate (Low Z)	MC1675	70	7	1.3	250	617,620
Bi-Quinary Counter (High Z)	MC1678	70	7	*350 MHz typ	750 $\lll$	620
Bi-Quinary Counter (Low Z)	MC1679	70	7	*350 MHz typ	750 $\lll$	620
Random Access Memory (RAM) Cell (High Z)	MC1680	70	7	Read Delay 2.5 Write Delay 3.5	270	620
Content Addressable Memory (CAM) Cell (High Z)	MC1682	70	7	Search Delay 2.8 Write Delay 4.0	270	620
Content Addressable Random Access (CARAM) Memory Cell (High Z)	MC1684	70	7	Read Delay 2.5 Search Delay 2.8 Write Delay 4.0	270	620
UHF Prescaler Type D Flip-Flop	MC1690†	70	7	**500 MHz Min	200	617,620,650
Quad Line Receiver	MC1692†	70	7	1.1	220	617,620,650
4-Bit Shift Register (High Z)	MC1694	70	7	*325 MHz typ	750 $\lll$	620

① L suffix denotes Dual In-Line Ceramic Package, S suffix denotes Ceramic Flat Package with a stud, P suffix denotes Dual In-Line Plastic Package, (i.e., MC1600L = Ceramic Dual In-Line Package, MC1600S = Ceramic Flat Package with a stud, MC1600P = Plastic Dual In-Line Package).  $\lll$  Requires Heat Sink — IERC LIC - 14A2CB or equivalent \*Maximum Operating Frequency

\*\*Toggle Frequency

† These MECL III part types are available in the flat package upon request.

#DC Loading Factors are based on:

1. Full load output current,  $I_L = -25$  mAdc max
2. Maximum input current,  $I_{in} = 350$   $\mu$ Adc (High Z)  
3.1 mAdc (Low Z)



\*MC660 Series (-30 to +75°C)

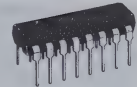
Motorola's MHTL integrated circuits are especially designed to meet the requirements of industrial applications because of the outstanding noise immunity. MHTL circuits provide error-free operation in high noise environments far beyond the tolerance of other integrated circuit families. Multifunction packages and broad operating temperature range further tailor this device family to the industrial designer's requirements.

\*MHTL cermaic dual in-line devices are available with specification over the -55°C to +125°C temperature range and/or with hi-rel processing on special order. See your Motorola representative for pricing.



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116

**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620

**L SUFFIX**  
CERAMIC PACKAGE  
CASE 632  
TO-116



## FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 15 \text{ V} \pm 1.0 \text{ Vdc}$ , $T_A = 25^\circ\text{C}$ )

Function	Type ① -30 to +75°C	Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg	Case
Expandable Dual 4-Input Gate (active pullup)	MC660	10	110	88/26 ②	632,646
Expandable Dual 4-Input Gate (passive pullup)	MC661	10	125	88/26 ②	632,646
Expandable Dual 4-Input Line Driver	MC662	30	140	180/26 ②	632,646
Dual J-K Flip-Flop	MC663	9	3.0 MHz③	200	632,646
Master-Slave R-S Flip-Flop	MC664	8	3.0 MHz③	160	632,646
Triple Level Translator	MC665	MDTL = 8 MTTL III = 5.5 MRTL = 5	40	83 (MDTL) 104 (MRTL)	632,646
Triple Level Translator	MC666	10	75	105	632,646
Dual Monostable Multivibrator	MC667	10	140	240	632,646
Quad 2-Input Gate (passive pullup)	MC668	10	125	176/52②	
Dual 4-Input Expander	MC669	—	—	—	632,646
Triple 3-Input Gate (passive pullup)	MC670	10	125	132/39②	632,646
Triple 3-Input Gate (active pullup)	MC671	10	110	132/39②	632,646
Quad 2-Input Gate (active pullup)	MC672	10	110	176/52②	632,646
Dual 2-Input AND-OR-INVERT Gate	MC673	10	110	160/50②	632,646
Dual 2-Input AND-OR-INVERT Gate	MC674	10	125	160/50②	632,646
Dual Pulse Stretcher	MC675	10	150 (pins 1,6) 110 (pins 5,6)	180	632,646
BCD-To-Decimal Decoder-Driver	MC676	—	—	380	620,648
Hex Inverter With Strobe (active pullup)	MC677	10	110	246/96②	620,648
Hex Inverter With Strobe (without output resistors)	MC678	10	125	192/96②	620,648
Dual Lamp Driver	MC679,B	125	0.5 $\mu\text{s}$ typ	250/30②	632,646
Hex Inverter	MC680	10	110	246/96②	632,646
Hex Inverter (open collector)	MC681	10	125	192/96②	632,646
Quad Latch	MC682	10	250	375	620,648
Quad 2-Input Exclusive OR	MC683	10	—	380	632,646
Decade Counter	MC684	10	0.5 MHz③	480	620,648
Binary Counter	MC685	10	0.5 MHz③	480	620,648
4-Bit Shift Register	MC686	10	0.5 MHz③	480	620,648
Dual J-K Flip-Flop	MC688	10	2.5 MHz③	375	620,648
Hex Inverter (high voltage)	MC689	10	150	173/55②	632,646
Hex Inverter (active pullup)	MC690	10	150	173/55②	632,646
• Dual Line Driver/Receiver	MC696	10 @ 10 V $V_{CC}$ 15 @ 25 V $V_{CC}$	750 nsec.	225/60 ②	620,648

① L suffix denotes Dual In-Line Ceramic Package, P denotes Dual In-Line Plastic Package (i.e., MC660L = Dual In-Line Ceramic, MC660P = Dual In-Line Plastic Package)

② Inputs High/Input Low      ③  $f_{Tog}$

• New Device



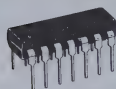
MC5400 Series (−55 to +125°C)

MC7400 Series (0 to +70°C)

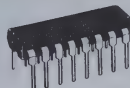
MC5400/MC7400 series integrated circuits comprise a family of transistor-transistor logic designed for general purpose digital applications. The family has a medium operating speed (15-30 MHz clock rate), good external noise immunity, high fan out, and the capability of driving capacitive loads of up to 600 pF.

## MAXIMUM RATINGS

Rating	Value	Unit
Power Supply Voltage	7.0	Vdc
Input Voltage	5.5	Vdc
Operating Temperature Range	MC5400 MC7400	−55 to +125 0 to +70
Storage Temperature Range — Ceramic Plastic	−65 to +150 −55 to +125	°C



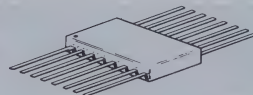
**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116



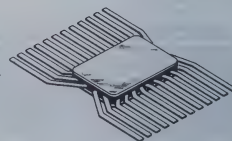
**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 649

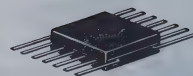


**F SUFFIX**  
CERAMIC PACKAGE  
CASE 650



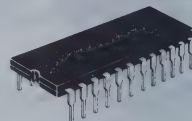
**F SUFFIX**  
CERAMIC PACKAGE  
CASE 667

**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620

**L SUFFIX**  
CERAMIC PACKAGE  
CASE 623



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 632  
TO-116

FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 5.0\text{ V}$ ,  $T_A = 25^\circ\text{C}$ )

Function	Type ①				Loading Factor Each Output	Propa- gation Delay ns typ	Power Dissipation mW typ/pkg
	−55 to +125°C	Case	0 to +70°C	Case			
Quad 2-Input NAND Gate	MC5400F,L	607,632	MC7400F,L,P	607,632,646	10	10	40
Quad 2-Input NAND Gate (Open Collector)	MC5401F,L	607,632	MC7401F,L,P	607,632,646	10	35	40
Quad 2-Input NOR Gate	MC5402F,L	607,632	MC7402F,L,P	607,632,646	10	10	40
Quad 2-Input NAND Gate (Open Collector)	MC5403L	632	MC7403L,P	632,646	10	35	40
Hex Inverter	MC5404F,L	607,632	MC7404F,L,P	607,632,646	10	13	60
Hex Inverter	MC5405L	632	MC7405L,P	632,646	10	35	60
Hex Inverter Buffer/Driver (Open Collector)	MC5406L	632	MC7406L,P	632,646	10	15	105
Hex Buffer/Driver (Open Collector)	MC5407L	632	MC7407L,P	632,646	10	14	145
Quad 2-Input AND Gate	MC5408L	632	MC7408L,P	632,646	10	15	70
Quad 2-Input AND Gate (Open Collector)	MC5409L	632	MC7409L,P	632,646	10	15	70
Triple 3-Input NAND Gate	MC5410F,L	607,632	MC7410F,L,P	607,632,646	10	10	30
Hex Inverter Buffer/Driver (Open Collector)	MC5416L	632	MC7416L,P	632,646	10	15	105
Hex Buffer/Driver	MC5417L	632	MC7417L,P	632,646	10	14	145
Dual 4-Input NAND Gate	MC5420F,L	607,632	MC7420F,L,P	607,632,646	10	10	20
Quad 2-Input Interface NAND Gate	MC5426L	632	MC7426L,P	632,646	10	17	40
8-Input NAND Gate	MC5430F,L	607,632	MC7430F,L,P	607,632,646	10	10	10
Quad 2-Input Positive NAND Buffer	MC5437F,L	607,632	MC7437F,L,P	607,632,646	30	—	50
Quad 2-Input Positive NAND Buffer (Open Collector)	MC5438F,L	607,632	MC7438F,L,P	607,632,646	30	—	50
Dual 4-Input NAND Buffer	MC5440F,L	607,632	MC7440F,L,P	607,632,646	30	13	50

① F suffix denotes Flat Package. L suffix denotes Dual In-Line Ceramic Package. P suffix denotes Dual In-Line Plastic Package. (continued)



# MTTL MC5400/MC7400 SERIES (continued)

## FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 5.0 \text{ V}$ , $T_A = 25^\circ\text{C}$ )

Function	Type ①				Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +70°C	Case			
BCD-to-Decimal Decoder and High-Level Driver	MC5441A,L	620	MC7441A,L,P	620,648	—	—	105
BCD-to-Decimal Decoder	MC5442L	620	MC7442L,P	620,648	10	22/23#	140
Excess Three-to-Decimal Decoder	MC5443L	620	MC7443L,P	620,648	10	22/23#	140
Excess Three Gray-to-Decimal Decoder	MC5444L	620	MC7444L,P	620,648	10	22/23#	140
BCD to One-of-Ten Decoder/Driver	MC5445L	620	MC7445L,P	620,648	—	50 max	215
BCD-to-Seven Segment Decoder/Driver	MC5446L	620	MC7446L,P	620,648	BI/RBO 5	—	265
BCD-to-Seven Segment Decoder/Driver	MC5447L	620	MC7447L,P	620,648	BI/RBO 5	—	265
BCD-to-Seven Segment Decoder/Driver	MC5448L	620	MC7448L,P	620,648	BI/RBO = 5 a thru g = 4	—	265
BCD-to-Seven Segment Decoder/Driver	MC5449F	607	MC7449F	607	6	—	165
Expandable Dual 2-Wide 2-Input AND-OR-INVERT Gate	MC5450F,L	607,632	MC7450F,L,P	607,632,646	10	13	28
Dual 2-Wide 2-Input AND-OR-INVERT Gate	MC5451F,L	607,632	MC7451F,L,P	607,632,646	10	13	28
Expandable 4-Wide 2-Input AND-OR-INVERT Gate	MC5453F,L	607,632	MC7453F,L,P	607,632,646	10	13	22
4-Wide 2-Input AND-OR-INVERT Gate	MC5454F,L	607,632	MC7454F,L,P	607,632,646	10	13	22
Dual 4-Input Expander for AND-OR-INVERT Gates	MC5460F,L	607,632	MC7460F,L,P	607,632,646	—	5.0	8.0
J-K Flip-Flop	MC5470L	632	MC7470L,P	632,646	10	30	65
J-K Flip-Flop	MC5472F,L	607,632	MC7472F,L,P	607,632,646	10	30	40
Dual J-K Flip-Flop	MC5473F,L	607,632	MC7473F,L,P	607,632,646	10	30	80
Quad Latch	MC5475L	620	MC7475L,P	620,648	10	30	160
Dual J-K Flip-Flop	—	—	MC7476P	648	10	30	80
Dual Type D Flip-Flop	MC5479F,L	607,632	MC7479F,L,P	607,632,646	10	16	84
Gated Full Adder	MC5480L	632	MC7480L,P	632,646	$S_{\Sigma} = 10$ $C_{out} = 5$ $A^*, B^*, = 3$	10/55*	105
2-Bit Full Adder	MC15482F,L	607,632	MC17482F,L,P	607,632,646	10	15/12*	165
2-Bit Full Adder	MC25482F,L	607,632	MC27482F,L,P	607,632,646	10	25/12*	165
4-Bit Binary Full Adder	MC5483L	620	MC7483L,P	620,648	$S = 10$ $C_{out} = 5$	35	390
16-Bit Scratch Pad Memory Cell With Gated Inputs	MC5484L	620	—	—	$I_{OL} = 40 \text{ mA}$ Open Collector $I_{OL} = 20 \text{ mA}$	Write Mode 25	250
	—	—	MC7484L,P	620,648		Sense Mode 15	
Decade Counter	MC5490F,L	607,632	MC7490F,L,P	607,632,646	10	20/bit	160
8-Bit Shift Register	MC5491A,L	632	MC7491A,L,P	632,646	10	25	175
Divide-by-Twelve Counter	MC5492F,L	607,632	MC7492F,L,P	607,632,646	10	60	160
4-Bit Binary Counter	MC5493F,L	607,632	MC7493F,L,P	607,632,646	10	20/bit	160
4-Bit Shift Register	MC5494L	620	MC7494L,P	620,648	—	25	175
4-Bit Shift Register	MC5495F,L	607,632	MC7495F,L,P	607,632,646	10	25	250
5-Bit Shift Register	MC5496L	620	MC7496P	648	—	25	240
Dual 4-Bit Latch	MC54100F,L	667,623	MC74100F,L,P	667,623,649	10	30	320
Dual J-K Flip-Flop	MC54107F,L	607,632	MC74107F,L,P	607,632,646	10	30	80
Monostable Multivibrator	MC54121F,L	607,632	MC74121F,L,P	607,632,646	10	$t_{PLH}$ B to Q = 35	90
BCD to One-of-Ten Decoder/Driver	MC54145L	620	MC74145L,P	620,648	—	50 max	215
16-Channel Data Selector	MC54150L	623	MC74150L,P	623,649	—	8.5 to 35	200
8-Channel Data Selector	MC54151L	620	MC74151L,P	620,648	—	8.5 to 35	145

① F suffix denotes Flat Package. L suffix denotes Dual In-Line Ceramic Package. P suffix denotes Dual In-Line Plastic Package. (continued)

\* Add delay/Carry delay.

# 2 Logic Levels/3 Logic Levels.



# MTTL MC5400/MC7400 SERIES (continued)

FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 5.0 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ )

Function	Type ①				Loading Factor Each Output	Propa- gation Delay ns typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +70°C	Case			
8-Channel Data Selector/Multiplexer	MC54152F,L	607,632	MC74152F,L,P	607,632,646	10	8.5 to 35	130
Dual 4-Channel Data Selector/ Multiplexer	MC54153F,L	650,620	MC74153F,L,P	650,620,648	10	12 to 22	180
Dual 2-to-4 Line Decoder/ 1-to-4 Line Demultiplexer	MC54155F,L	650,620	MC74155F,L,P	650,620,648	10	2 Logic Levels = 16 3 Logic Levels = 21	125
Dual 2-to-4 Line Decoder/ 1-to-4 Line Demultiplexer	MC54156L	650,620	MC74156F,L,P	650,620,648	10	2 Logic Levels = 16 3 Logic Levels = 21	125
Quad 2-Input Data Selector/Multiplexer	MC54157F,L	650,620	MC74157F,L,P	650,620,648	10	40	150
8-Bit Parallel Out Serial Shift Register	MC54164AF,L	607,632	MC74164AF,L,P	607,632,646	5	$f_{\text{tog}} =$ 36 MHz	185
8-Bit Odd/Even Generator/Checker	MC54180L	632	MC74180P	646	10	15 to 30	170
4-Bit Arithmetic Logic Unit/Function Generator	MC54181F,L	623,667	MC74181F,L,P	623,649,667	10	12 to 35	470
Look-Ahead Carry Generator	MC54182F,L	650,620	MC74182F,L,P	650,620,648	10	—	180
Presetable Decade Up/Down Counter	MC54192F,L	620,640	MC74192F,L,P	620,648,650	10	14 to 31	325
Presetable 4-Bit Binary Up/Down Counter	MC54193F,L	620,650	MC74193F,L,P	620,648,650	10	14 to 31	325
Binary to One-of-Eight Line Decoder	MC54406F,L	607,632	MC74406F,L,P	607,632,646	10	14	100
8 Bit Parity Tree	MC54408F,L	607,632	MC74408F,L,P	607,632,646	10	15 to 30	150
Programmable Modulo-N Decade Counter	MC54416L	620	MC74416L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Programmable Modulo-N Decade Counter	MC54417L	620	MC74417L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Programmable Modulo-N Hexadecimal Counter	MC54418L	620	MC74418L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Programmable Modulo-N Hexadecimal Counter	MC54419L	620	MC74419L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Counter Latch Decoder	MC54450L	620	MC74450L,P	620,648	Open Collector $I_{OL} = 40 \text{ mA}$	$f_{\text{tog}} =$ 40 MHz	450
Dual Decade Counter	MC54452F,L	650,620	MC74452F,L,P	650,620,648	10	$f = 40 \text{ MHz}$	350
Dual Hexadecimal Counter	MC54453F,L	650,620	MC74453F,L,P	650,620,648	10	$f = 40 \text{ MHz}$	350
Dual Decade Up/Down Counter	MC54454L	623	MC74454L,P	623,649	10	40	600
Dual Binary Up/Down Counter	MC54455L	623	MC74455L,P	623,649	10	40	600
NBCD Adder	MC54456F,L	650,620	MC74456F,L,P	650,620,648	10	30	300
Bus Transfer Switch	MC54460L	620	MC74460L,P	620,648	—	D to B = 8.0 B to Q = 25	250

① F suffix denotes Flat Package. L suffix denotes Dual In-Line Ceramic Package. P suffix denotes Dual In-Line Plastic Package.

\* Add delay/Carry delay. MC544xx/744xx is exact replacement for MC43xx/40xx. # 2 Logic Levels/3 Logic Levels.

➤ To be announced.



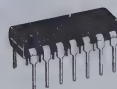
MC400 Series (0 to +75°C)

MC500 Series (-55 to +125°C)

MTTL integrated circuits comprise a family of transistor-transistor logic designed for general purpose digital applications. The family has a medium operating speed (20 MHz clock rate), good external noise immunity, high fan out, and the capability of driving lines up to 600 pF capacitance.

## MAXIMUM RATINGS

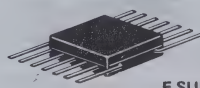
Rating	Value	Unit
Supply Voltage — Continuous MC500/550 Series MC400/450 Series	+8.0 +7.0	Vdc
Supply Operating Voltage Range	4.5 to 6.0	Vdc
Input Voltage	+5.5	Vdc
Output Voltage	+5.5	Vdc
Operating Temperature Range MC500/550 Series MC400/450 Series	-55 to +125 0 to +75	°C
Storage Temperature Range Ceramic Package Plastic Package	-65 to +150 -55 to +125	°C
Maximum Junction Temperature MC500/550 Series MC400/450 Series	+175 +150	°C
Thermal Resistance — Junction To Case ( $\theta_{JC}$ ) Ceramic Package Plastic Package	0.09 0.15	°C/mW
Thermal Resistance — Junction To Ambient ( $\theta_{JA}$ ) Ceramic Package Plastic Package	0.26 0.30	°C/mw



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 632  
TO-116



**F SUFFIX**  
CERAMIC FLAT PACKAGE  
CASE 607  
TO-86

FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 5.0 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ )

Function	Type ①		Loading Factor Each Output		Propagation Delay  ns typ	Power Dissipation mW typ/pkg
	Case 607,632,646 0 to +75°C	Case 607, 632 -55 to +125°C	MC400 Series	MC500 Series		
Dual 4-Input NAND Gate	MC400 MC450	MC500 MC550	12 6	15 7	10	30
Expandable 4-Wide 2-2-2-3-Input AND-OR-INVERT Gate	MC401 MC451	MC501 MC551	12 6	15 7	12	30
8-Input NAND Gate	MC402 MC452	MC502 MC552	12 6	15 7	12	15
2-Wide 3-Input AND-OR-INVERT Gate with Gated Complement	MC403 MC453	MC503 MC553	12 6	15 7	11	35
Expandable 3-Wide 3-Input AND-OR-INVERT Gate	MC404 MC454	MC504 MC554	12 6	15 7	12	25
Expandable 2-Wide 4-Input AND-OR-INVERT Gate	MC405 MC455	MC505 MC555	12 6	15 7	12	20
Expandable 8-Input NAND Gate	MC406 MC456	MC506 MC556	12 6	15 7	18	15
Line Driver	MC407 MC457	MC507 MC557	12 6	15 7	25 @ 1000 pF Load	60
Quad 2-Input NAND Gate	MC408 MC458	MC508 MC558	12 6	15 7	10	60
4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates	MC409 MC459	MC509 MC559	12 6	15 7	—	—
Dual 4-Input Expander for AND-OR-INVERT Gates	MC410 MC460	MC510 MC560	12 6	15 7	—	—
Dual 4-Input Expander for NAND Gates	MC411 MC461	MC511 MC561	12 6	15 7	—	—

① F suffix denotes Flat Package, L suffix denotes dual in-line Ceramic Package, P suffix denotes dual in-line Plastic Package, (i.e., MC401F = Flat Package, MC401L = Ceramic Package, MC401P = Plastic Package.)

(continued)



# MTTL I INTEGRATED CIRCUITS (continued)

## FUNCTIONS AND CHARACTERISTICS (continued)

Function	Type ①		Loading Factor Each Output		Propagation Delay	Power Dissipation mW typ/pkg
	Case 607, 632, 646 0 to +75°C	Case 607, 632 -55 to +125°C	MC400 Series	MC500 Series		
	ns typ					
Triple 3-Input NAND Gate	MC412 MC462	MC512 MC562	12 6	15 7	10	45
R-S Flip-Flop	MC413 MC463	MC513 MC563	12 6	15 7	20/15*	30
Gated R-S Flip-Flop	MC414 MC464	MC514 MC564	12 6	15 7	20/7.5*	30
AND J-K Flip-Flop	MC415 MC465	MC515 MC565	12 6	15 7	13/25*	40
OR J-K Flip-Flop	MC416 MC466	MC516 MC566	12 6	15 7	13/25*	50
Triple 2-Input Buss Driver	MC419 MC469	MC519 MC569	— —	— —	50/15*	54
Expandable Dual 2-Wide 2-Input AND-OR-INVERT Gate	MC420 MC470	MC520 MC570	12 6	15 7	12	40
AC Coupled R-S Flip-Flop	MC421 MC471	MC521 MC571	12 6	15 7	18	30
Dual Type D Flip-Flop	MC422 MC472	MC522 MC572	12 6	15 7	16	84
Dual J-K Flip-Flop (separate clock)	MC423 MC473	MC523 MC573	13 7	16 8	10/12*	110
Dual J-K Flip-Flop (common clock)	MC424 MC474	MC524 MC574	13 7	16 8	10/12*	110
Dual 3-Input Pulse Shaper/Delay AND Gate	MC426 MC476	MC526 MC576	13 7	16 8	15	60
OR Expandable Dual 4-Input AND Gate	MC427 MC477	MC527 MC577	12 6	15 7	10	38
Dual 2-Wide 2-3 Input OR Expander	MC428 MC478	MC528 MC578	— —	— —	—	15
Hex Inverter	MC429 MC479	MC529 MC579	12 6	15 7	10	90

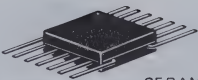
① F suffix denotes Flat Package, L suffix denotes dual in-line Ceramic Package, P suffix denotes dual in-line Plastic Package, (i.e., MC401F = Flat Package, MC401L = Ceramic Package, MC401P = Plastic Package.)

\* $t_{pd+}/t_{pd-}$



MC2000 Series (0 to +75°C)  
MC2100 Series (−55 to +125°C)

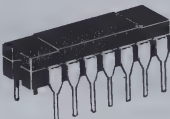
MTTL II integrated circuits comprise a family of transistor-transistor logic designed for general purpose digital applications. The family has a high operating speed (30-50 MHz clock rate), good external noise immunity, high fan out, and the capability of driving capacitive loads to 600 pF.



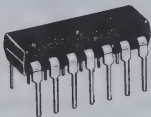
F SUFFIX  
CERAMIC FLAT PACKAGE  
CASE 607  
TO-86

MAXIMUM RATINGS

Rating	Value	Unit
Supply Voltage-Continuous — MC2100 Series MC2000 Series	+8.0 +7.0	Vdc
Supply Operating Voltage Range	4.5 to 6.0	Vdc
Input Voltage	+5.5	Vdc
Output Voltage	+5.5	Vdc
Operating Temperature Range — MC2100 Series MC2000 Series	−55 to +125 0 to +75	°C
Storage Temperature Range — Ceramic Package — Plastic Package	−65 to +150 −55 to +125	°C
Maximum Junction Temperature — MC2100 Series MC2000 Series	+175 +150	°C
Thermal Resistance-Junction to Case (θJC) — Ceramic Package — Plastic Package	0.09 0.15	°C/mW
Thermal Resistance-Junction to Ambient (θJA) — Ceramic Package — Plastic Package	0.26 0.30	°C/mW



L SUFFIX  
CERAMIC PACKAGE  
CASE 632  
TO-116



P SUFFIX  
PLASTIC PACKAGE  
CASE 646  
TO-116

FUNCTIONS AND CHARACTERISTICS (VCC = 5.0 V, TA = 25°C)

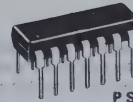
Function	Type ①		Loading Factor Each Output		Propagation Delay	Power Dissipation mW typ/pkg
	Case 607, 632, 646 0 to +75°C	Case 607, 632 -55 to +125°C	MC2000 Series	MC2100 Series		
	ns typ					
Expandable 2-Wide 4-Input AND-OR-INVERT Gate	MC2000 MC2050	MC2100 MC2150	9 5	11 6	7.0	27
Quad 2-Input NAND Gate	MC2001 MC2051	MC2101 MC2151	9 5	11 6	6.0	88
4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates	MC2002 MC2052	MC2102 MC2152	9 5	11 6	—	28
Dual 4-Input NAND Gate	MC2003 MC2053	MC2103 MC2153	9 5	11 6	6.0	44
Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate	MC2004 MC2054	MC2104 MC2154	9 5	11 6	7.0	36
8-Input NAND Gate	MC2005 MC2055	MC2105 MC2155	9 5	11 6	8.0	22
Dual 4-Input Expander for AND-OR-INVERT Gates	MC2006 MC2056	MC2106 MC2156	9 5	11 6	—	14
Triple 3-Input NAND Gate	MC2007 MC2057	MC2107 MC2157	9 5	11 6	6.0	66
Expandable 8-Input NAND Gate	MC2011 MC2061	MC2111 MC2161	9 9	11 6	11	22
Expandable 3-Wide 3-Input AND-OR-INVERT Gate	MC2012 MC2062	MC2112 MC2162	9 5	11 6	6.0	39
Expandable Dual 2-Wide 2-Input AND-OR-INVERT Gate	MC2013 MC2063	MC2113 MC2163	9 5	11 6	7.0	58
Quad 2-Input Lamp/ Line Driver	— MC2065	— MC2165	— 24	— 30	20	105
Hex Inverter	MC2016 MC2066	MC2116 MC2166	5 5	9 9	6.0	132
Dual J-K Flip-Flop (separate clock)	MC2023 MC2073	MC2123 MC2173	9 5	11 6	f = 70 MHz	110
Dual J-K Flip-Flop (common clock)	MC2024 MC2074	MC2124 MC2174	9 5	11 6	f = 70 MHz	110
AND J-K Flip-Flop	MC2025 MC2075	MC2125 MC2175	9 5	11 6	f = 50 MHz	50
OR J-K Flip-Flop	MC2026 MC2076	MC2126 MC2176	9 5	11 6	f = 50 MHz	60
OR J-K Flip-Flop	MC2028 MC2078	MC2128 MC2178	9 5	11 6	f = 35 MHz	60

① F suffix denotes Flat Package, L denotes Dual In-Line Ceramic Package, P denotes Plastic Package, (i.e., MC2000F = Flat Package, MC2100L = Dual In-Line Ceramic, MC2000P = Plastic Package.)

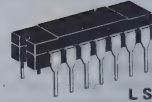


MC3000 Series (0 to +75°C)  
MC3100 Series (-55 to +125°C)

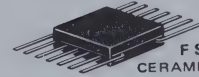
MTTL III integrated circuits comprise a family of transistor-transistor logic designed for general purpose digital applications. The family has a high operating speed (30-50 MHz clock rate), good external noise immunity, high fan-out, and the capability of driving lines up to 600 pF capacitance.



P SUFFIX  
PLASTIC PACKAGE  
CASE 646  
TO-116



L SUFFIX  
CERAMIC PACKAGE  
CASE 632  
TO-116



F SUFFIX  
CERAMIC PACKAGE  
CASE 607  
TO-86

# FUNCTIONS AND CHARACTERISTICS (V<sub>CC</sub> = 5.0 V, T<sub>A</sub> = 25°C)

Function	Type ①		Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	Case 605, 607, 632 0 to +70°C	Case 607, 632 -55°C to +125°C			
Quad 2-Input NAND Gate	MC3000(74H00)	MC3100(54H00)	10	6.0	88
Quad 2-Input AND Gate	MC3001(74H08)	MC3101(54H08)	10	9.0	112
Quad 2-Input NOR Gate	MC3002(74H02)	MC3102(54H02)	10	6.0	122
Quad 2-Input OR Gate	MC3003(74H32)	MC3103(54H32)	10	9.0	150
Quad 2-Input NAND Gate (Open Collector)	MC3004(74H01)	MC3104(54H01)	10	8.0	88
Triple 3-Input NAND Gate	MC3005(74H10)	MC3105(54H10)	10	6.0	66
Triple 3-Input AND Gate	MC3006(74H11)	MC3106(54H11)	10	9.0	84
Triple 3-Input NAND Gate (Open Collector)	MC3007(74H12)	MC3107(54H12)	10	8.0	66
Hex Inverter	MC3008(74H04)	MC3108(54H04)	10	6.0	140
Hex Inverter	MC3009(74H05)	MC3109(54H05)	10	8.0	90
Dual 4-Input NAND Gate	MC3010(74H20)	MC3110(54H20)	10	6.0	44
Dual 4-Input AND Gate	MC3011(74H21)	MC3111(54H21)	10	9.0	56
Dual 4-Input NAND Gate (Open Collector)	MC3012(74H22)	MC3112(54H22)	10	8.0	44
8-Input NAND Gate	MC3015(74H31)	MC3115(54H31)	10	8.0	22
8-Input NAND Gate	MC3016(74H30)	MC3116(54H30)	10	8.0	22
4-Wide 3-2-2-3 Input Expander For AND-OR-INVERT Gates	MC3018(74H62)	MC3118(54H62)	**	Δt <sub>pd1</sub> = 0.4 Δt <sub>pd0</sub> = 0.05	40
Triple 3-Input Expander For AND-OR Gates	MC3019(74H61)	MC3119(54H61)	**	Δt <sub>pd1</sub> = 0.4 Δt <sub>pd0</sub> = 0.05	25
Expandable Dual 2-Wide 2-Input AND-OR-INVERT Gate	MC3020(74H50)	MC3120(54H50)	10	6.0	62.5
Quad 2-Input Exclusive OR Gate	MC3021(74H86)	MC3121(54H86)	8	14	100
Quad 2-Input Exclusive NOR Gate	MC3022(74H89)	MC3122(54H89)	8	14	85
Dual 2-Wide 2-Input AND-OR-INVERT Gate	MC3023(74H51)	MC3123(54H51)	10	6.0	62.5
Dual 4-Input NAND Buffer Gate	MC3024(74H40)	MC3124(54H40)	30	6.0	90
Dual 4-Input NAND Power Gate	MC3025(74H36)	MC3125(54H36)	20	6.0	70
Dual 4-Input AND Power Gate	MC3026(74H39)	MC3126(54H39)	20	9.0	90
Dual 3-Input 3-Output AND Series Terminated Line Driver	MC3028(74H28)	MC3128(54H28)	*	9.0	56
Dual 3-Input 3-Output NAND Series Terminated Line Driver	MC3029(74H29)	MC3129(54H29)	*	6.0	44
Dual 4-Input Expander for AND-OR-INVERT Gates	MC3030(74H60)	MC3130(54H60)	**	Δt <sub>pd</sub> = 1.0	15
Expandable 4-Wide 2-2-2-3 Input AND-OR Gate	MC3031(74H52)	MC3131(54H52)	10	10	87.5
Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate	MC3032(74H53)	MC3132(54H53)	10	7.0	40
4-Wide 2-2-2-3 Input AND-OR-INVERT Gate	MC3033(74H54)	MC3133(54H54)	10	7.0	40
Expandable 2-Wide 4-Input AND-OR-INVERT Gate	MC3034(74H55)	MC3134(54H55)	10	7.0	30
AND J-K Flip-Flop	MC3050(74H115)	MC3150(54H115)	10	f = 40 MHz	80
AND Input J-K Flip-Flop	MC3051(74H116)	MC3151(54H116)	10	f = 50 MHz	50
AND Input J-K Flip-Flop	MC3052(74H117)	MC3152(54H117)	10	f = 40 MHz	75
Double-Edge-Triggered Master-Slave Type D Flip-Flop	MC3053(74H118)	MC3153(54H118)	10	—	100
OR Input J-K Flip-Flop	MC3054(74H71)	MC3154(54H71)	10	f = 30 MHz	95
AND Input J-K Flip-Flop	MC3055(74H72)	MC3155(54H72)	10	f = 30 MHz	80
Dual Type D Flip-Flop	MC3060(74H79)	MC3160(54H79)	10	f = 30 MHz	120
Dual J-K Flip-Flop	MC3061(74H119)	MC3161(54H119)	10	f = 50 MHz	100
Dual J-K Flip-Flop	MC3062(74H120)	MC3162(54H120)	10	f = 50 MHz	100
Dual J-K Flip-Flop	MC3063(74H73)	MC3163(54H73)	10	f = 30 MHz	176
Edge-Triggered Dual Type D Flip-Flop	MC74H74A	MC54H74A	10	16	84

① F suffix denotes Flat Package, L suffix denotes Dual In-Line Ceramic Package, P suffix denotes Plastic Package, (i.e., MC3000F = Flat Package, MC3000L = Ceramic Package, MC3000P = Plastic Package).

\*Direct Output = 10 minus the number of resistor-terminated outputs being used.

\*\*Full output loading factor of the expandable gate is maintained.

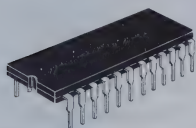
• New Devices



## INTEGRATED CIRCUITS

The MTTL complex functions are designed for digital applications in the medium to high-speed range.

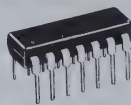
These MTTL devices provide significant reduction in package count and increased logic per function over devices in the basic MTTL and MDTL families.



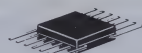
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 623



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 632  
TO-116



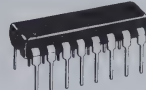
**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116



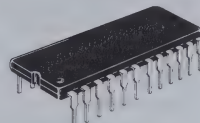
**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86



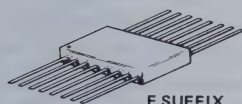
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620



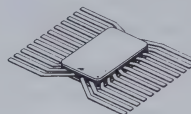
**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648



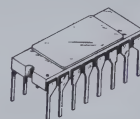
**P SUFFIX**  
PLASTIC PACKAGE  
CASE 649



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 650



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 667



**AL SUFFIX**  
CERAMIC PACKAGE  
CASE 690

### FUNCTIONS AND CHARACTERISTICS ( $V_{CC} = 5.0 \text{ V}$ , $T_A = 25^\circ\text{C}$ )

All devices shown can be used with all MTTL and MDTL devices; however, the loading factors shown reflect use with other devices in the same MC-number series unless otherwise noted.

Function	Type ①				Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +75°C	Case			
Dual 4-Channel Data Selector	MC4300F,L	607,632	MC4000F,L,P	607,632,646	10	Control Line = 18 Data Line = 11	150
BCD-to-Binary/Binary-to-BCD Number Converter	—	—	MC4001L,P	620,648	Open Collector $I_{OL} = 16 \text{ mA}$	Address Time <45 ns	300
Dual Data Distributor	—	—	MC4002F,L,P	607,632,646	10	10.5	175
16-Bit Scratch Pad Memory Cell	MC4304F,L	607,632	MC4004F,L,P	607,632,646	$I_{OL} = 40 \text{ mA}$ Open Collector $I_{OL} = 20 \text{ mA}$	Write mode: 25 Sense mode: 15	250
16-Bit Scratch Pad Memory Cell	MC4305F,L	607,632	MC4005F,L,P	607,632,646		Write mode: 25 Sense mode: 15	250
Binary to One-of-Eight Line Decoder	†MC4306F,L	607,632	†MC4006F,L,P	607,632,646	10	14	100
Dual Binary to One-of-Four Line Decoder	MC4307L	620	MC4007L,P	620,648	10	14	125
8-Bit Parity Tree	†MC4308F,L	607,632	†MC4008F,L,P	607,632,646	10	15 to 30	150
Dual 4-Bit Parity Tree	MC4310F,L	607,632	MC4010F,L,P	607,632,646	10	9.5 to 22	125
4-Bit Shift Register	—	—	MC4012F,L,P	607,632,646	10	22/bit	180
Quad Type D Flip-Flop	—	—	MC4015L,P	620,648	10	16	190
Programmable Modulo-N Decade Counter	†MC4316L	620	†MC4016L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Programmable Modulo-N Hexadecimal Counter	†MC4318L	620	†MC4018L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Dual 4-Bit Comparator (Open Collector)	—	—	MC4021P	648	10	20	250
Dual 4-Bit Comparator	—	—	MC4022P	648	10	20	250
4-Bit Universal Counter	—	—	MC4023F,L,P	607,632,646	10	16/bit	200
Dual Voltage-Controlled Multivibrator	MC4324F,L	607,632	MC4024F,L,P	607,632,646	7	$f_{max} = 30 \text{ MHz}$	150
Full Adder	MC4326F,L	607,632	MC4026F,L,P	607,632,646	15/12**	25/13#	90
Full Adder	MC4327F,L	607,632	MC4027F,L,P	607,632,646	7/6**	25/13#	90
Adder (Dependent Carry)	MC4328F,L	607,632	MC4028F,L,P	607,632,646	15/12**	25/13#	125
Adder (Dependent Carry)	MC4329F,L	607,632	MC4029F,L,P	607,632,646	7/6**	25/13#	125
Adder (Independent Carry)	MC4330F,L	607,632	MC4030F,L,P	607,632,646	15/12**	25/13#	125
Adder (Independent Carry)	MC4331F,L	607,632	MC4031F,L,P	607,632,646	7/6**	25/13#	125
Carry Decoder	MC4332F,L	607,632	MC4032F,L,P	607,632,646	—	$\Delta t_{pd} = 4.0/\text{decoder}$	20
Quad Latch (Open Collector)	MC4335F,L	607,632	MC4035F,L,P	607,632,646	7	25	140
Quad Latch	MC4337F,L	607,632	MC4037F,L,P	607,632,646	10	25	150

① F suffix denotes ceramic flat package. L suffix denotes ceramic dual in-line package. P suffix denotes plastic dual in-line package.

\*\* MC4300 Series/MC4000 Series; loading specified for use with MTTL I devices. # Add delay/Carry delay. † High/Low

‡ MC544xx/744xx is exact replacement for MC43xx/40xx.



# MTTL COMPLEX LOGIC FUNCTIONS (continued)

## FUNCTIONS AND CHARACTERISTICS (continued)

Function	Type ①				Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +75°C	Case			
Inverting/Non-Inverting One-of-Eight Decoder	—	—	MC4038P	648	Open Collector $I_{OL} = 20 \text{ mA}$	Address Time < 45 ns	240
Seven-Segment Character Generator	—	—	MC4309P	648			240
Binary to Two-of-Eight Decoder	—	—	MC4040P	648			240
Single-Error Hamming Code Detector and Generator	—	—	MC4041P	648			240
Quad Predriver	—	—	MC4042F,L,P	607,632,646	$I_{OL} = 50 \text{ mA}$ Open Collector	15	120
Dual Line Selector	—	—	MC4043F,L,P	607,632,646	$I_{OL} = 400 \text{ mA}$ Pulsed	20	70
Phase-Frequency Detector	MC4344F,L	607,632	MC4044F,L,P	607,632,646	10	9.0	85
Non-Inverting One-of-Eight Decoder	—	—	MC4048P	648	10	Address Time < 50 ns	240
Counter-Latch Decoder	‡MC4350F,L	650,620	‡MC4050F,L,P	650,620,648	Open Collector $I_{OL} = 40 \text{ mA}$	$f_{\text{tog}} = 40 \text{ MHz}$	450
Counter-Latch Decoder	—	—	MC4051F,L,P	650,620,648	Open Emitter 40 mA Sourcing Capability @ 10% Duty Cycle	$f_{\text{tog}} = 35 \text{ MHz}$	450
Dual Majority Logic Gate	—	—	MC4062P	646	—	$Z = 20$ $Z = 11$	75
BCD-to-Decimal Decoder and High-Level Driver	MC5441AL	620	MC7441AL,P	620,648	—	—	105
BCD-to-Decimal Decoder	MC5442L	620	MC7442L,P	620,648	10	2 Logic Levels = 22 3 Logic Levels = 23	140
Excess Three-to-Decimal Decoder	MC5443L	620	MC7443L,P	620,648	10	2 Logic Levels = 22 3 Logic Levels = 23	140
Excess Three Gray-to-Decimal Decoder	MC5444L	620	MC7444L,P	620,648	10	2 Logic Levels = 22 3 Logic Levels = 23	140
BCD to One-of-Ten Decoder/Driver	MC5445L	620	MC7445L,P	620,648	—	50 max	215
BCD-to-Seven Segment Decoder/Driver	MC5446L	620	MC7446L,P	620,648	BI/RBO = 5	—	265
BCD-to-Seven Segment Decoder/Driver	MC5447L	620	MC7447L,P	620,648	BI/RBO = 5	—	265
BCD-to-Seven Segment Decoder/Driver	MC5448L	620	MC7448L,P	620,648	BI/RBO = 5 a thru g = 4	—	265
BCD-to-Seven Segment Decoder/Driver	MC5449F	607	MC7449F	607	6	—	165
Quad Latch	MC5475L	620	MC7475L,P	620,648	10	30	160
Gated Full Adder	MC5480L	632	MC7480L,P	632,646	$S.S. = 10$ $C_{\text{out}} = 5$ A*, B* = 3	55/10#	105
2-Bit Full Adder	MC15482F,L	607,632	MC17482F,L,P	607,632,646	10	15/12#	165
2-Bit Full Adder	MC25482F,L	607,632	MC27482F,L,P	607,632,646	10	15/12#	165
4-Bit Binary Full Adder	MC5483L	620	MC7483L,P	620,648	$S = 10$ $C_{\text{out}} = 5$	35	390
16-Bit Scratch Pad Memory Cell With Gated Inputs	MC5484L	620	—	—	$I_{OL} = 40 \text{ mA}$ Open Collector $I_{OL} = 20 \text{ mA}$	Write Mode: 25 Sense Mode: 15	250
	—	—	MC7484L,P	620,648			
Decade Counter	MC5490F,L	607,632	MC7490F,L,P	607,632,646	10	20/bit	160
8-Bit Shift Register	MC5491AL	632	MC7491AL,P	632,646	10	25	175
Divide-by-Twelve Counter	MC5492F,L	607,632	MC7492F,L,P	607,632,646	10	60	160
4-Bit Binary Counter	MC5493F,L	607,632	MC7493L,P	632,646	10	20/bit	160
4-Bit Shift Register	MC5494L	620	MC7494L,P	620,648	—	25	175
4-Bit Shift Register	MC5495F,L	607,632	MC7495F,L,P	607,632,646	10	25	250
5-Bit Shift Register	MC5496F,L	650,620	MC7496F,L,P	650,620,648	—	25	240
Dual 4-Bit Latch	MC54100F,L	667,623	MC74100F,L,P	667,623,649	10	30	320
Monostable Multivibrator	MC54121F,L	607,632	MC74121F,L,P	607,632,646	10	$t_{\text{PLH}}$ , B to Q = 35	90
BCD to One-of-Ten Decoder/Driver	MC54145L	620	MC74145L,P	620,648	—	50 max	215
16-Channel Data Selector	MC54150L	623	MC74150L,P	623,649	—	8.5 to 35	200
8-Channel Data Selector	MC54151L	620	MC74151L,P	620,648	—	8.5 to 35	145
8-Channel Data Selector/Multiplexer	MC54152F,L	607,632	MC74152F,L,P	607,632,646	10	8.5 to 35	130
Dual 4 Channel Data Selector/Multiplexer	MC54153F,L	650,620	MC74153F,L,P	650,620,648	10	12 to 22	180
Dual 2-to-4 Line Decoder/1-to-4 Line Demultiplexer	MC54155F,L	650,620	MC74155F,L,P	650,620,648	10	2 Logic Levels = 16 3 Logic Levels = 21	125
Dual 2-to-4 Line Decoder/1-to-4 Line Demultiplexer (Open Collector)	MC54156F,L	650,620	MC74156F,L,P	650,620,648	10	2 Logic Levels = 16 3 Logic Levels = 21	125
Quad 2-Input Data Selector/Multiplexer	MC54157F,L	650,620	MC74157F,L,P	650,620,648	10	40	150
8-Bit Parallel-Out Serial Shift Register	MC54164AF,L	607,632	MC74164A,F,L,P	607,632,646	5	$f_{\text{tog}} = 36 \text{ MHz}$	185
8-Bit Odd/Even Generator/Checker	MC54180L	632	MC74180P	646	10	15 to 30	170
4-Bit Arithmetic Logic Unit/Function Generator	MC54181F,L	667,623	MC74181F,L,P	667,649	10	12 to 35	470

① F suffix denotes ceramic flat package. L suffix denotes ceramic dual in-line package. P suffix denotes plastic dual in-line package.

\*\* MC4300 Series/MC4000 Series; loading specified for use with MTTL I devices. # Add delay/Carry delay. † High/Low

‡ MC544xx/744xx is exact replacement for MC43xx/40xx.



# MTTL COMPLEX LOGIC FUNCTIONS (continued)

## FUNCTIONS AND CHARACTERISTICS (continued)

Function	Type ①				Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +75°C	Case			
Look-Ahead Carry Generator	MC54182F,L	650,620	MC74182F,L,P	650,620,648	10	—	180
Presettable Decade Up/Down Counter	MC54192F,L	650,620	MC74192F,L,P	650,620,648	10	14 to 31	325
Presettable 4-Bit Binary Up/Down Counter	MC54193F,L	650,620	MC74193F,L,P	650,620,648	10	14 to 31	325
Binary to One-of-Eight Line Decoder	†MC54406F,L	607,632	†MC74406F,L,P	607,632,646	10	14	100
8-Bit Parity Tree	†MC54408F,L	607,632	†MC74408F,L,P	607,632,646	10	15 to 30	150
Programmable Modulo-N Decade Counter	†MC54416L	620	†MC74416L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
▶ Programmable Modulo-N Counter	MC54417L	620	MC74417L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Programmable Modulo-N Hexadecimal Counter	†MC54418L	620	†MC74418L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
▶ Programmable Modulo-N Counter	MC54419L	620	MC74419L,P	620,648	8	Clock to Q3 = 50 Clock to Bus = 35	250
Counter-Latch-Decoder	†MC54450F,L	650,620	†MC74450F,L,P	650,620,648	Open Collector I <sub>OL</sub> = 40 mA	f <sub>tot</sub> = 40 MHz	450
Dual Decade Counter	MC54452F,L	650,620	MC74452F,L,P	650,620,648	10	f = 40 MHz	350
Dual Hexadecimal Counter	MC54453F,L	650,620	MC74453F,L,P	650,620,648	10	f = 40 MHz	350
Dual Decade Up/Down Counter	MC54454L	623	MC74454L,P	623,649	10	40	600
Dual Binary Up/Down Counter	MC54455L	623	MC74455L,P	623,649	10	40	600
NBCD Adder	MC54456F,L	650,620	MC74456F,L,P	650,620,648	10	30	300
Bus Transfer Switch	MC54460L	620	MC74460L,P	620,648	—	D to B = 8.0 B to Q = 25	250
Quad Exclusive OR Gate	MC8241F,L	607,632	MC7241F,L,P	607,632,646	10	10	225
Quad Exclusive NOR Gate (Open Collector)	MC8242F,L	607,632	MC7242F,L,P	607,632,646	10	18	170
Binary to One-of-Eight Decoder	MC8250L	632	MC7250L,P	632,646	10	30	75
Binary to One-of-Ten Decoder	MC8251L	620	MC7251L,P	620,648	10	30	80
Arithmetic Logic Element	MC8260F,L	667,623	MC7260F,L,P	667,623,649	6	14 to 24	400
Fast Carry Extender	MC8261F,L	607,632	MC7261F,L,P	607,632,646	6	8.0 to 16	95
2-Input, 4-Bit Data Selector	MC8266F,L	650,620	MC7266F,L,P	650,620,648	10	13 to 27	200
2-Input, 4-Bit Data Selector (Open Collector)	MC8267F,L	650,620	MC7267F,L,P	650,620,648	10	13 to 27	200
4-Bit Shift Register	MC8270F,L	607,632	MC7270F,L,P	607,632,646	7.5	25	180
4-Bit Shift Register	MC8271F,L	650,620	MC7271F,L,P	650,620,648	7.5	25	180
Presettable Decade Counter	MC8280F,L	607,632	MC7280F,L,P	607,632,646	4	f <sub>tot</sub> = 25 MHz	130
Presettable Binary Counter	MC8281F,L	607,632	MC7281F,L,P	607,632,646	4	f <sub>tot</sub> = 25 MHz	130
Universal 4-Bit Shift Register	MC9300F,L	650,620	MC8300F,L,P	650,620,648	6	f <sub>tot</sub> = 25 MHz	300
BCD to Decimal Decoder	MC9301F,L	650,620	MC8301F,L,P	650,620,648	10	22	125
Dual Full Adder	MC9304F,L	650,620	MC8304F,L,P	650,620,648	C <sub>01</sub> , C <sub>02</sub> = 7 S <sub>1</sub> , S <sub>2</sub> = 10 S <sub>1</sub> , S <sub>2</sub> = 9	8.0 to 28	110
Presettable Decade Up/Down Counter	MC9306L	623	MC8306L,P	623,649	6	Clock to Q = 20	350
BCD-to-Seven Segment Decoder	MC9307F,L	650,620	MC8307F,L,P	650,620,648	MC9307/8307 a thru g = 8/7 RBO = 2/1.5	250	165
Dual 4-Bit Latch	MC9308F,L	667,623	MC8308F,L,P	667,623,649	9	E to Q = 25	325
Dual 4-Channel Data Selector	MC9309F,L	650,620	MC8309F,L,P	650,620,648	Z, W = 10 Z, W = 9	9.0 to 24	150
Presettable Decade Counter	MC9310F,L	650,620	MC8310F,L,P	650,620,648	6	14 to 35	300
One of 16 Decoder	MC9311F,L	667,623	MC8311F,L,P	667,623,649	10	E to Q = 26 max	175
8-Channel Data Selector	MC9312F,L	650,620	MC8312F,L,P	650,620,648	Z = 20/10† Z = 18/9†	9.0 to 24	135
Quad Latch	MC9314F,L	650,620	MC8314F,L,P	650,620,648	10	12 to 25	200
Presettable 4-Bit Binary Counter	MC9316F,L	650,620	MC8316F,L,P	650,620,648	6	14 to 35	300
8-Input Priority Encoder	MC9318F,L	650,620	MC8318F,L,P	650,620,648	F <sub>out</sub> = 5 GS = 6 Q = 10	10 to 30	225
Quad 2-Input Data Selector/Multiplexer	MC9322F,L	650,620	MC8322F,L,P	650,620,648	10	40	150
5-Bit Comparator	MC9324L	620	MC8324L,P	620,648	10	40	220
Dual 8-Bit Shift Register	MC9328L	620	MC8328L,P	620,648	6	C to Q = 22 (t <sub>PHL</sub> ) 13 (t <sub>PLH</sub> ) MR to Q = 35	250
8-Channel Data Selector/Multiplexer	MC93152L	632	MC83152L,P	632,646	10	8.5 to 35	130
Dual 4-Channel Data Selector/Multiplexer	MC93153L	620	MC83153L,P	620,648	10	12 to 22	180
Retriggerable Monostable Multivibrator	MC9601F,L	607,632	MC8601F,L,P	607,632,646	MC9601 = 6 MC8601 = 8	25	75
Dual Retriggerable Resettable Monostable Multivibrator	MC9602F,L	650,620	MC8602F,L,P	650,620,648	MC9602 = 6 MC8602 = 8	25	160
Monostable Multivibrator	MC9603F,L	607,632	MC8603F,L,P	607,632,646	10	t <sub>PLH</sub> , B to Q = 35	90

① F suffix denotes ceramic flat package. L suffix denotes ceramic dual in-line package. P suffix denotes plastic dual in-line package.

•• MC4300 Series/MC4000 Series; loading specified for use with MTTL I devices. # Add delay/Carry delay. †High/Low

†MC544xx/744xx is exact replacement for MC43xx/40xx.

▶ To be announced



# MTTL COMPLEX LOGIC FUNCTIONS (continued)

## FUNCTIONS AND CHARACTERISTICS (continued)

Function	Type ①				Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +85°C	Case			
64-Bit Random Access Memory	—	—	MCM4064L	620	Open Collector I <sub>OL</sub> = 15 mA	Access Time <60 ns	6 mW/bit
0 to +70°C							
Binary to BCD Number Converter	—	—	MCM4067AL	690	Open Collector I <sub>OL</sub> = 12 mA	Address Time <50 ns	615
	—	—	MCM4068AL	690			
Hollerith to ASCII Converter	—	—	MCM4069AL	690	Open Collector I <sub>OL</sub> = 12 mA	Address Time <40 ns	615
	—	—	MCM4070AL	690			

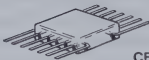
① F suffix denotes ceramic flat package. L suffix denotes ceramic dual in-line package. P suffix denotes plastic dual in-line package.



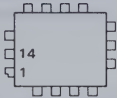
MCBC5400 Series (-55 to +125°C)  
MCB5400F Series (-55 to +125°C)

MCBC5400/MCB5400F series integrated circuits comprise a family of transistor-transistor logic designed for general purpose digital applications. The family has a medium operating speed (15-30 MHz clock rate), good external noise immunity, high fan out, and the capability of driving capacitive loads of up to 600 pF.

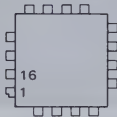
This series is produced using beam lead sealed junction technology. These devices are particularly useful in highly reliable systems using hybrid beam lead assembly techniques or standard flat package assembly techniques.



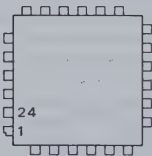
F SUFFIX  
CERAMIC PACKAGE  
CASE 607



BEAM LEAD CHIP  
(14 Lead)  
(Geometry Side Down)  
• (actual size)



BEAM LEAD CHIP  
(16 Lead)  
(Geometry Side Down)  
• (actual size)



BEAM LEAD CHIP  
(24 Lead)  
(Geometry Side Down)  
• (actual size)

MAXIMUM RATINGS

Rating	Value	Unit
Power Supply Voltage	7.0	Vdc
Input Voltage	5.5	Vdc
Operating Temperature Range	-55 to +125	°C
Storage Temperature Range — Ceramic	-65 to +150	°C

FUNCTIONS AND CHARACTERISTICS (VCC = 5.0 V, TA = 25°C)

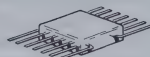
Function	Type		Loading Factor Each Output	Propagation Delay ns typ	Power Dissipation mW typ/pkg
	Chip -55° to +125°C	Case 607 -55° to +125°C			
Quad 2-Input NAND Gate	MCBC5400	MCB5400F	10	10	40
Quad 2-Input NAND Gate (Open Collector Output)	MCBC5401	MCB5401F	10	35	40
Quad 2-Input NOR Gate	MCBC5402	MCB5402F	10	10	48
Hex Inverter	MCBC5404	MCB5404F	10	13	60
Hex Inverter (Open Collector)	MCBC5405	MCB5405F	10	35	60
Triple 3-Input NAND Gate	MCBC5410	MCB5410F	10	10	30
Dual 4-Input NAND Gate	MCBC5420	MCB5420F	10	10	20
8-Input NAND Gate	MCBC5430	MCB5430F	10	10	10
Dual 4-Input NAND Buffer	MCBC5440	MCB5440F	30	13	50
Expandable Dual 2-Wide 2-Input AND-OR-INVERT Gate	MCBC5450	MCB5450F	10	13	28
Dual 2-Wide 2-Input AND-OR-INVERT Gate	MCBC5451	MCB5451F	10	13	28
Expandable 4-Wide 2-Input AND-OR-INVERT Gate	MCBC5453	MCB5453F	10	13	22
4-Wide 2-Input AND-OR-Invert Gate	MCBC5454	MCB5454F	10	13	22
Dual 4-Input Expander for AND-OR-INVERT Gate	MCBC5460	MCB5460F	—	5.0	8.0
J-K Flip-Flop	MCBC5472	MCB5472F	10	30	40
Dual J-K Flip-Flop	MCBC5473	MCB5473F	10	30	80
Dual Type D Flip-Flop	MCBC5479	MCB5479F	10	16	84
4-Input AND Driver with NOR Strobe	—	MCB54140F	—	70	20



MCE54H00 Series, MCE5400 Series (-55 to +125°C)  
MCE74H00 Series, MCE7400 Series (0 to +70°C)



The Dielectrically Isolated Integrated Circuit (DIIC) MTTL family is designed specifically for use in military and space applications that require a high degree of reliability under severe radiation environments and post irradiation operation. The MTTL DIIC family utilizes nichrome resistors, post metalization passivation, monometallic interconnections, and very small high frequency transistor structures to enhance the radiation resistant qualities of this line.



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86

## FUNCTIONS AND CHARACTERISTICS (V<sub>CC</sub> = 5.0 V, T<sub>A</sub> = 25°C)

Function	MCE54H00/74H00 Series Type		Loading Factor Each Output	Propa- gation Delay ns typ	Power Dissipation m/W typ/pkg
	-55 to +125°C	0 to +70°C			
Quad 2-Input NAND Gate	MCE54H00	MCE74H00	10	6.0	80
Quad 2-Input NAND Gate (Open Collector Output)	MCE54H01	MCE74H01	10	8.0	80
Hex Inverter	MCE54H04	MCE74H04	10	6.0	120
Triple 3-Input NAND Gate	MCE54H10	MCE74H10	10	6.0	60
Dual 4-Input NAND Gate	MCE54H20	MCE74H20	10	6.0	40
11-Input NAND Gate	MCE54H31	MCE74H31	10	9.0	20
Dual 4-Input NAND Power Gate	MCE54H40	MCE74H40	30	6.0	80
Dual 2-Wide 2-Input AND-OR-INVERT Gate	MCE54H51	MCE74H51	10	6.0	58
4-Wide 2-Input AND-OR-INVERT Gate	MCE54H54A	MCE74H54A	10	6.0	40
Dual 2-Wide 2-3-Input AND-OR-INVERT Gate	MCE54H56	MCE74H56	10	6.0	58
4-Wide 3-3-2-3-Input AND-OR-INVERT Gate	MCE54H57	MCE74H57	10	6.0	40
Dual Type D Flip-Flop	MCE54H79	MCE74H79	10	16	140
Binary To One-Of-Eight Line Decoder	MCE54H146	MCE74H146	10	—	130
	MCE5400/7400 Series Type		10	8.0	100
	-55 to +125°C	0 to +70°C			
Dual J-K Flip-Flop	MCE54103	MCE74103	10	8.0	100

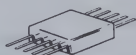
## NETWORKS

## Dielectrically Isolated INTEGRATED CIRCUITS

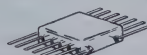
## NETWORKS

### MCE7000 SERIES (0° to +100°C)

The MCE7000 series uses a dielectric isolation instead of the usual junction isolation to combat the effects of gamma radiation. Each component is isolated by a high resistance (10<sup>10</sup> ohms) layer of SiO<sub>2</sub>. Dielectric isolation also lowers inter-component capacitance and improves efficiency.



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 606  
TO-91



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86

Function	Type	Power Dissipation mW typ/pkg	Case
Seven-Diode Array	MCE7003	—	607
Diode-Resistor Network	MCE7005	20*	606
Sixteen-Diode Array	MCE7006	—	606
Twelve-Resistor Network	MCE7007	97	607

\* 100 Ω resistor.



MCE930 Series (–55 to +125°)



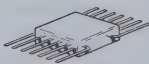
The Dielectrically Isolated MDTL family is intended for use in military and space applications that require a high degree of reliability under severe radiation environments. In addition to dielectric isolation, this family of devices utilizes nichrome resistors throughout. Apost-metalization passivation process further enhances the radiation resistance qualities of the family and very small high frequency tran-

sistor structures are used throughout.

Dielectrically Isolated MDTL has the same electrical specifications as the MC930 family and may be used interchangeably with it. This eliminates the need for redesigning existing equipment to gain radiation-resistance and allows the design engineer to utilize a familiar logic type for new systems.

MAXIMUM RATINGS

Rating	Value	Unit
Supply Voltage – Continuous	8.0	Vdc
Pulsed, < 1 second	12	
Output Current (into outputs) – Buffers, Power Gates – Continuous	150	mAdc
Pulsed, < 30 ms	300	
All other types	30	
Input Forward Current	–10	mAdc
Input Reverse Current – Buffers, Power Gates	5.0	mAdc
All other types	1.0	
Operating Temperature Range – MCE930 Series	–55 to +125	°C
Storage Temperature Range	–65 to +150	°C



F SUFFIX  
CERAMIC PACKAGE  
CASE 607  
TO-86

FUNCTIONS AND CHARACTERISTICS (V<sub>CC</sub> = 5.0 Vdc, T<sub>A</sub> = 25°C)

Function	Type Case 607 –55 to +125°C	Loading Factor Each Output	Power Dissipation mW typ/pkg
Expandable Dual 4-Input NAND Gate	MCE930	8.0	22
Expandable Dual 4-Input Buffer	MCE932	25	85
Dual 4-Input Expander	MCE933	–	–
Hex Inverter	MCE936	8	66
Expandable Dual 4-Input NAND Power Gate	MCE944	27	65
Clocked Flip-Flop	MCE945	10	60
Quad 2-Input NAND Gate	MCE946	8	44
Clocked Flip-Flop	MCE948	9.0	70
Triple 3-Input NAND Gate	MCE962	8.0	33



MC830 Series (0 to +75°C)

MC930 Series (-55 to +125°C)

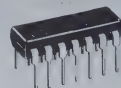
## MAXIMUM RATINGS

Rating	Value	Unit
Supply Voltage — Operating Continuous Pulsed, < 1 second	4.5 to 5.5 8.0 12	V <sub>dc</sub>
Output Current (Into Outputs with Outputs Low) Buffers, Power Gates — Continuous Pulsed, < 30 ms All other types — Continuous Pulsed, < 30 ms	100 300 30 90	mA <sub>dc</sub>
Input Forward Current — Continuous Pulsed, < 30 ms or Negative Voltage at Input — Continuous Pulsed, < 30 ms	-10 -30 -0.5 -1.5	mA <sub>dc</sub> V <sub>dc</sub>
Input Reverse Current or Positive Voltage at Diode Input	1.0 5.5	mA <sub>dc</sub> V <sub>dc</sub>
Operating Temperature Range MC930 Series MC830 Series	-55 to +125 0 to +75	°C
Storage Temperature Range Metal Can, Ceramic Package Plastic Package	-65 to +150 -55 to +125	°C
Maximum Junction Temperature MC930 Series MC830 Series	175 150	°C

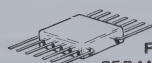
MDTL integrated circuits provide an excellent balance of speed, power dissipation, and noise immunity for general purpose digital applications. The line includes many multifunction types. Additional logic power is provided by the "wired OR" capability of the basic MDTL gate.



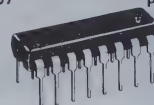
G SUFFIX  
METAL PACKAGE  
CASE 603-02  
TO-100



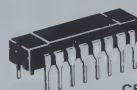
P SUFFIX  
PLASTIC PACKAGE  
CASE 646  
TO-116



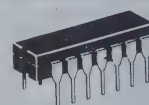
F SUFFIX  
CERAMIC PACKAGE  
CASE 607  
TO-86



P SUFFIX  
PLASTIC PACKAGE  
CASE 648



L SUFFIX  
CERAMIC PACKAGE  
CASE 620



L SUFFIX  
CERAMIC PACKAGE  
CASE 632  
TO-116

FUNCTIONS AND CHARACTERISTICS (V<sub>CC</sub> = 5.0 V<sub>dc</sub>, T<sub>A</sub> = 25°C)

Function	Type ① 0 to +75°C	Case	Type ① -55 to +125°C	Case	Loading Factor Each Output	Propaga- tion Delay ns typ	Power Dissipation mW typ/pkg
Expandable Dual 4 Input NAND Gate	MC830	607,632,646	MC930	607,632	8	30	22
Expandable Dual 3 2 Input NAND Gate	MC830	603	MC930	603	8	30	22
Expandable Dual 4 Input Buffer	MC832	607,632,646	MC932	607,632	25	35	85
Expandable Dual 3 2 Input Buffer	MC832	603	MC932	603	25	35	85
Dual 4 Input Expander	MC833	607,632,646	MC933	607,632	—	—	—
Dual 4 3 Input Expander	MC833	603	MC933	603	—	—	—
Hex Inverter	MC834	607,632,646	MC934	607,632	8	30	66
Hex Inverter (without output resistors)	MC835	607,632,646	MC935	607,632	8	30	42
Hex Inverter	MC836	607,632,646	MC936	607,632	8	30	66
Hex Inverter	MC837	607,632,646	MC937	607,632	7	25	90
Decade Counter	MC838	607,632,646	MC938	607,632	8	30 MHz ③	150
Divide-by-Sixteen Counter	MC839	607,632,646	MC939	607,632	8	30 MHz ③	150
Hex Inverter (without input diodes)	MC840	607,632,646	MC940	607,632	8	30	66
Hex Inverter (without output resistors and input diodes)	MC841	607,632,646	MC941	607,632	8	30	42
4 Input AND Driver with NOR Strobe	MC843	603	MC943	603	250 mA	80	50
Expandable Dual 4-Input Power Gate	MC844	607,632,646	MC944	607,632	27	30	65
Expandable Dual 3 2 Input Power Gate	MC844	603	MC944	603	27	30	65
Clocked Flip-Flop	MC845	603,607,632,646	MC945	603,607,632	12/10 ②	40	60
Quad 2-Input NAND Gate	MC846	607,632,646	MC946	607,632	8	30	44
Quad Inverter	MC846	603	MC946	603	8	30	44
Quad 2-Input Gate Expander	MC847	607,632,646	MC947	607,632	—	—	—
Clocked Flip-Flop	MC848	603,607,632,646	MC948	603,607,632	11/9 ②	40	70
Quad 2-Input NAND Gate (2 k pullup resistor)	MC849	607,632,646	MC949	607,632	7	25	66
Quad Inverter (2 k pullup resistor)	MC849	603	MC949	603	7	25	60
Pulse Triggered Binary Monostable Multivibrator	MC850	603,607,632,646	MC950	603,607,632	10/8 ②	15	50
	MC851	603,607,632,646	MC951	603,607,632	10	40	30
Dual J-K Flip-Flop (common clock and C <sub>D</sub> , separate S <sub>D</sub> )	MC852	607,632,646	MC952	607,632	12/10 ②	40	120
Dual J-K Flip-Flop (separate clock and S <sub>D</sub> , no C <sub>D</sub> )	MC853	607,632,646	MC953	607,632	12/10 ②	40	120

(continued)

① F suffix denotes Ceramic Flat Package, G suffix denotes Metal Can, L suffix denotes Dual In-Line Ceramic Package, P suffix denotes Dual In-Line Plastic Package. (i.e., MC830F = Metal Can, MC830F = Flat Package, MC830L = Dual In-Line Ceramic Package, MC830P = Plastic Package)

② Fan-out for MC830 series type/Fan-out for MC930 series type.

③ Counting frequency.



# MDTL INTEGRATED CIRCUITS (continued)

Function	Type ① 0 to +75°C	Case	Type ① -55 to +125°C	Case	Loading Factor Each Output	Propaga- tion Delay ns typ	Power Dissipation mW typ/pkg
Dual J-K Flip-Flop (common clock and C <sub>D</sub> , separate S <sub>D</sub> , 2k pullup resistor)	MC855	607,632,646	MC955	607,632	11/9 ②	40	140
Dual J-K Flip-Flop (separate clock and S <sub>D</sub> , no C <sub>D</sub> , 2k pullup resistor)	MC856	607,632,646	MC956	607,632	11/9 ②	40	140
Quad 2-Input Buffer	MC857	607,632,646	MC957	607,632	25	35	170
Quad 2-Input NAND Power Gate	MC858	607,632,646	MC958	607,632	27	30	130
Expandable Dual 4-Input NAND Gate (2k pullup resistor)	MC861	607,632,646	MC961	607,632	7	25	33
Expandable Dual 3-2 Input NAND Gate (2k pullup resistor)	MC861	603	MC961	603	7	25	33
Triple 3-Input NAND Gate	MC862	607,646	MC962	607,632	8	30	33
Dual 2-Input NAND Gate plus Inverter	MC862	603	MC962	603	8	30	30
Triple 3-Input NAND Gate (2k pullup resistor)	MC863	607,646	MC963	607,632	7	25	50
Dual 2-Input NAND Gate plus Inverter (2k pullup resistor)	MC863	603	MC963	603	7	25	45
Dual 6-Input NAND Gate	MC1800	607,632,646	MC1900	607,632	8	30	22
Dual 5-Input NAND Gate (2k pullup resistor)	MC1801	607,632,646	MC1901	607,632	7	25	33
Expandable 8-Input NAND Gate	MC1802	607,632,646	MC1902	607,632	8	30	11
Expandable 8-Input NAND Gate (2k pullup resistor)	MC1803	607,632,646	MC1903	607,632	7	25	16.5
10-Input NAND Gate	MC1804	607,632,646	MC1904	607,632	8	30	11
10-Input NAND Gate (2k pullup resistor)	MC1805	607,632,646	MC1905	607,632	7	25	16.5
Quad 2-Input AND Gate	MC1806	607,632,646	MC1906	607,632	8	35	72
Quad 2-Input AND Gate (2k pullup resistor)	MC1807	607,632,646	MC1907	607,632	7	30	85
Quad 2-Input OR Gate	MC1808	607,632,646	MC1908	607,632	8	35	97
Quad 2-Input OR Gate (2k pullup resistor)	MC1809	607,632,646	MC1909	607,632	7	30	115
Quad 2-Input NOR Gate	MC1810	607,632,646	MC1910	607,632	8	30	60
Quad 2-Input NOR Gate (2k pullup resistor)	MC1811	607,632,646	MC1911	607,632	7	25	72
Quad 2-Input Exclusive OR Gate	MC1812	607,632,646	MC1912	607,632	8	40	120
Quad Latch	MC1813	620,648	MC1913	620	7	35	220
Quad Latch	MC1814	607,632,646	MC1914	607,632	7	35	220
Parallel Gated Clocked Flip-Flop	MC1815	607,632,646	MC1915	607,632	12/10 ②	40	65
Parallel Gated Clocked Flip-Flop	MC1816	607,632,646	MC1916	607,632	11/9 ②	40	75
Quad 2-Input NAND Gate (without output resistor)	MC1818	607,632,646	MC1918	607,632	8	30	32
High Voltage Hex Inverter	MC1820	632,646	—	—	7	40	42

① F suffix denotes Ceramic Flat Package, G suffix denotes Metal Can, L suffix denotes Dual in-Line Ceramic Package, P suffix denotes Dual in-Line Plastic Package. (i.e., MC830G = Metal Can, MC830F = Flat Package, MC830L = Dual in-Line Ceramic Package, MC830P = Plastic Package)

② Fan-out for MC830 series type/Fan-out for MC930 series type.

③ Counting frequency.

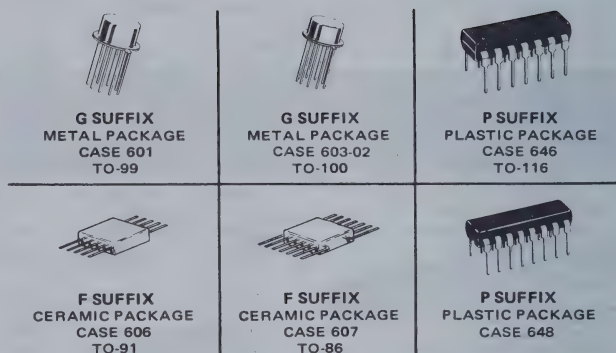


MC700 series (+15 to +55°C)

MC800 series (0 to +75 and 0 to +100°C)

MC900 series (-55 to +125°C)

Medium-power MRTL integrated circuits provide a broad line of low-cost, multi-function, digital circuits. Typical gate speed is 12 ns, with power dissipation averages of 19 mW (input high) and 5.0 mW (inputs low) per logic node. Devices from the MC700 Series have loading factors normalized for compatibility with the low-power mW MRTL devices for ease in mixing the two power levels in a system.



## FUNCTIONS AND CHARACTERISTICS

(V<sub>CC</sub> = 3.0 V ±10% for MC900 Series and MC800F, G Series; 3.6 V ±10% for MC800P Series and MC700 Series, T<sub>A</sub> = 25°C)

Function	Type ① MC700 Series +15 to +55°C	Case	Type ① MC800 Series 0 to +75°C	Case	Type ① MC800 Series 0 to +100°C	Case	Type ① MC900 Series -55 to +125°C	Case	Loading Factor Each Output			Power Dissipation mW typ/pkg	
									With mW MRTL	With MRTL	t <sub>p</sub> ns typ	MC700 and MC800P	MC800F,G and MC900 Series
Buffer	MC700	601,606			MC800	601,606	MC900	601,606	80	25	20	25/50	16/45
Counter Adapter	MC701	601			MC801	601	MC901	601	16	5	22	80	55
R-S Flip-Flop	MC702	601			MC802	601	MC902	601	13	4	14	32	22
3-Input NOR Gate	MC703	601,606			MC803	601,606	MC903	601,606	16	5	12	28/7.5	19/5.0
Half Adder	MC704	601,606			MC804	601,606	MC904	601,606	16	5	14	65	45
Half Shift Register	MC705	601,606			MC805	601,606	MC905	601,606	13	4	22	75	53
Half Shift Register (w/o inverter)	MC706	601,606			MC806	601,606	MC906	601,606	13	4	22	52	36
4-Input NOR Gate	MC707	601,606			MC807	601,606	MC907	601,606	16	5	12	30/7.5	19/5.0
Dual 2-Input NOR Gate	MC714	601,606			MC814	601,606	MC914	601,606	16	5	12	50/15	38/10
Dual 3-Input NOR Gate	MC715	603,606,646	MC815	646	MC815	603,606	MC915	603,606	16	5	12	55/15	38/10
J-K Flip-Flop	MC723	601,606,646	MC816	646	MC816	601,606	MC916	601,606	—	3	30	91/79	62/54
J-K Flip-Flop	MC724	601,606,646	MC824	646	MC824	607	MC924	607	16	5	12	100/30	76/20
Quad 2-Input NOR Gate	MC725	607,646	MC825	646	MC825	607	MC925	607	16	5	12	60/15	38/10
J-K Flip-Flop	MC726	603,606,646	MC826	646	MC826	603,606	MC926	603,606	16	5	35	100/86	130/65
Quad Inverter	MC727	603,606	MC827	603,606	MC827	603,606	MC927	603,606	16	5	12	87/30	76/20
5-Input NOR Gate	MC729	601,606	MC829	603,606	MC829	603,606	MC929	601,606	16	5	12	37/7.5	19/5.0
Quad Exclusive OR Gate	MC771	607,646	MC871	646	MC871	607	MC971	607	16	5	12	28	72
J-K Flip-Flop	MC774	601	MC874	601	MC874	607	MC974	601	16	5	35	100/86	130/65
Dual Half-Adder	MC775	607,646	MC875	646	MC875	607	MC975	607	16	5	20	120	90
Binary Up Counter	MC777	646	MC877	646	MC877	607			10	3	—	180	—
1J-K Flip-Flop, 1 Expander, 2 Buffers	MC779	646	MC879	646	MC879	607			10	3	—	141/124	—
Decade Up Counter	MC780	646	MC880	646	MC880	607			10	3	—	250	—
Dual Half Shift Register	MC783	607,646	MC883	646	MC883	607	MC983	607	13	4	22	140	110
Dual Half Shift Register (w/inverter)	MC784	607,646	MC884	646	MC884	607	MC984	607	13	4	22	100	75
Quad 2-Input Expander	MC785	607,646	MC885	646	MC885	607	MC985	607	—	—	12	20/—	17/—
Dual 4-Input Expander	MC786	607,646	MC886	646	MC886	607	MC986	607	—	—	12	20/—	17/—
1J-K Flip-Flop, 1 Inverter, 2 Buffers	MC787	646	MC887	646	MC887	607			—	—	—	138/132	4
Dual 3-Input Buffer, non-inverting	MC788	607,646	MC888	646	MC888	607	MC988	607	80	25	24	145/56	128/42
Hex Inverter	MC789	607,646	MC889	646	MC889	607	MC989	607	16	5	12	130/15	76/20
Dual J-K Flip-Flop	MC790	607,646	MC890	646	MC890	607	MC990	607	10	3	35	182/158	124/108
Dual J-K Flip-Flop	MC791	607,646	MC891	646	MC891	607	MC991	607	16	5	40	190/160	155/130
Triple 3-Input NOR Gate	MC792	607,646	MC892	646	MC892	607	MC992	607	16	5	12	82/24	57/15
Serial-Parallel Shift Register	MC794	646	MC894	646	MC894	607			16	5	55	225	190
Dual Full Adder	MC796	607,646	MC896	646	MC896	607	MC996	607	16	5	60	225	190
Dual Full Subtractor	MC797	607,646	MC897	646	MC897	607	MC997	607	16	5	60	225	190
Dual Buffer	MC799	603,606,646	MC899	646	MC899	603,606	MC999	603,606	80	25	15	50/90	32/90
Dual 4-Channel Data Selector	MC9701	648	MC9801	648	MC9801	607			16	5	25	100	—
Dual J-K Flip-Flop	MC9702	646	MC9802	648	MC9802	607			10	3	35	182/158	—
4-Bit Parallel Full Adder	MC9704	648	MC9804	648	MC9804	607			6	2	125	265	—
Dual 4-Channel Data Distributor	MC9707	648	MC9807	648	MC9807	607			16	5	25	150	—
Quad Schmitt Trigger	MC9709	646	MC9809	646	MC9809	607			16	5	30	95	—
Quad 2-Input AND Gate	MC9713	646	MC9813	646	MC9813	607			16	5	28	100	—
Quad 2-Input NAND Gate	MC9714	646	MC9814	646	MC9814	607			16	5	12	145	—
Quad 2-Input OR Gate	MC9715	646	MC9815	646	MC9815	607			16	5	14	28/100	—
Hex Expander	MC9719	607,646	MC9819	646	MC9819	607	MC9919	607	—	—	12	13/—	—

"A" suffix devices have insured capability to drive at least one MTTL load or two MDTL loads.

① G Suffix denotes Metal Can, F suffix denotes Flat Package, P suffix denotes Plastic Package.

② Inputs High/Inputs Low

③ Only Clock Inputs High/Inputs Low

④ Only Clock Input high on flip-flop, other element Inputs High/Inputs Low

⑤ Operating Frequency (MHz)



MC708 series (+15 to +55°C)  
MC808 series (0 to +75°C)  
MC908 series (-55 to +125°C)

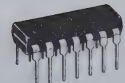
Low-power mW MRTL integrated circuits are designed for use where minimal system power consumption is desired. Typical gate speed is 27 ns, with typical power dissipation of 6.5 mW (input high) and 0.5 mW (inputs low) per logic node. Devices from the MC708 Series can be mixed with devices from the medium-power MC700 Series which has loading factors normalized for compatibility.



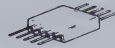
**G SUFFIX**  
METAL PACKAGE  
CASE 601  
TO-99



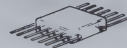
**G SUFFIX**  
METAL PACKAGE  
CASE 603-02  
TO-100



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 606  
TO-91



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648

## FUNCTIONS AND CHARACTERISTICS

(V<sub>CC</sub> = 3.0 V ± 10% for MC908 Series, 3.6 V ± 10% for MC808 Series and MC708 Series; T<sub>A</sub> = 25°C)

Function	Type ① MC708 Series +15 to +55°C	Type ① MC808 Series 0 to +75°C	Case	Type ① MC908 Series -55 to +125°C	Case	Loading Factor Each Output All Series	tp ns typ	Power Dissipation mW typ/pkg	
								MC708 Series & MC808 Series	MC908 Series
Half Adder	MC708	MC808	601,606	MC908	601,606	4	60	19/12.5 ②	14/8.5 ②
2-Input Buffer	MC709	MC809	601,606	MC909	601,606	30	57	7.0/23 ②	5.5/16 ②
Dual 2-Input NOR Gate	MC710	MC810	601,606	MC910	601,606	4	27	10/2.5 ②	8.0/1.0 ②
4-Input OR/NOR Gate	MC711	MC811	601,606	MC911	601,606	4	60	8.0/5.5 ②	6.0/3.5 ②
Half Adder	MC712	MC812	601,606	MC912	601,606	4	66	15.5/10.5 ②	11.5/5.5 ②
Type D Flip-Flop	MC713	MC813	601,606	MC913	601,606	3	75	24/17.5 ③	17.5/13 ③
Quad 2-Input NOR Gate	MC717	MC817	607,646	MC917	607	4	27	20/5.0 ②	16/2.5 ②
Dual 3-Input NOR Gate	MC718	MC818	603,606,646	MC918	603,606	4	27	12/2.5 ②	9.5/1.0 ②
Dual 4-Input NOR Gate	MC719	MC819	607,646	MC919	607	4	27	13/2.5 ②	11/1.0 ②
J-K Flip-Flop	MC720	MC820	601,606	MC920	601,606	2	50	20.5/14.5 ④	15.5/10 ④
Dual 2-Input Gate Expander	MC721	MC821	601,606	MC921	601,606	—	27	3.0/— ②	3.0/— ②
J-K Flip-Flop	MC722	MC822	603,606,646	MC922	603,606	4	70	24/20 ④	17.5/13 ④
5-Input NOR Gate	MC728	MC828	601,606	MC928	601,606	4	27	7.5/1.0 ②	6.5/0.5 ②
Dual Exclusive OR/NOR Gate	MC764	MC864	646	—	—	4	—	25	—
Quad Latch	MC767,A	MC867,A	648	—	—	9	50	110	—
BCD-To-Decimal Decoder	MC770	MC870	648	—	—	7	36	100/— ②	—
Dual J-K Flip-Flop	MC776	MC876	607,646	MC976	607	2	50	41/29 ④	31/20 ④
Dual Type D Flip-Flop	MC778	MC878	607,646	MC978	607	3	60	48/35 ③	35/26 ③
Dual Buffer	MC781	MC881	601	MC981	601	30	57	14/46 ②	11/32 ②
J-K Flip-Flop	MC782	MC882	601	MC982	601	2	80	23/21 ④	15/13 ④
Quad 3-Input NOR Gate	MC793	MC893	607,646	MC993	607	4	27	18/3.5 ②	14/2.0 ②
Dual 2-Input Buffer	MC798	MC898	607,646	MC998	607	30	57	14/46 ②	11/32 ②
Hex Inverter	MC9718	MC9818	646	—	—	4	27	7.0/3.0 ②	—
Hex Expander	MC9720	MC9820	646	—	—	—	12	30/— ②	—
Quad 2-Input Expander	MC9721	MC9821	607,646	MC9921	607	—	27	20/— ②	20/— ②
Dual J-K Flip-Flop	MC9722	MC9822	646	—	—	4	75	24/— ④	—
Quad 2-Input AND Gate	MC9723	MC9823	646	—	—	4	50	12 ⑤	—
Quad 2-Input NAND Gate	MC9724	MC9824	646	—	—	4	50	20/5.0 ②	—
Quad 2-Input OR Gate	MC9725	MC9825	646	—	—	4	50	—/7.0 ②	—

"A" suffix devices have insured capability to drive at least one MTTL load or two MDTL loads.

① G suffix denotes Metal Can, F suffix denotes Flat Package, P suffix denotes Plastic Package.

② Inputs High/Inputs Low unless otherwise noted.

③ Direct Set and Direct Clear Low, All other Inputs High/All Inputs Low.

④ Only Clock Input High/All Inputs Low.

⑤ One Input High/One Input Low.



MC1100 Series Metal Gate, High-Threshold P-Channel MOS

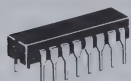
MC2200 Series Metal Gate, Low-Threshold P-Channel MOS

Motorola's MOS monolithic integrated circuits provide low-cost, high-complexity logic in functional blocks. These devices utilize the high component density and simplified processing available with the MOS technology.

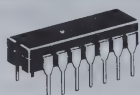


**G SUFFIX**  
METAL PACKAGE  
CASE 619-02

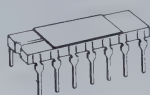
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CASE 602A



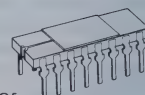
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CASE 620



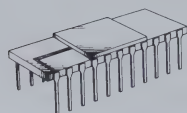
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CASE 632  
TO-116



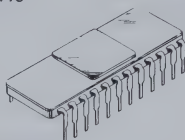
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CASE 637



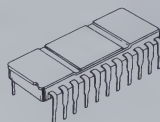
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CASE 638



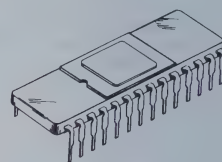
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 677



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 684



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 694



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 695

## FUNCTIONS AND CHARACTERISTICS

Function	Type	Temperature	Case	Comments
Triple 66 Bit Dynamic Shift Register	MC1141G	0 to +75°C	602A	Operating frequency = 10 kHz to 1.0 MHz, power dissipation = 1.0 mW/bit @ 1.0 MHz.
200-Bit Dynamic Shift Register	MC1142G	0 to +55°C	619-02	Operating frequency = 10 kHz to 1.0 MHz, power dissipation = 1.0 mW/bit @ 1.0 MHz.
8-Channel Multiplex Switch	MC1150L	0 to +75°C	638	High on/off resistance ratio, zero offset voltage, all channel blanking.
Dual 1-of-4 Channel Multiplex Switch	MC1151L	0 to +75°C	638	High on/off resistance ratio, zero offset voltage, all channel blanking.
General-Purpose Logic Element	MC1155L	0 to +75°C	632	Can be externally connected to form a variety of NAND, NOR and functional gate configurations.
Dual 100-Bit Static Shift Register	MC1160G	-55 to +85°C	602A	Operating frequency = dc to 2.0 MHz, non-inverting buffered outputs, independent input/output lines.
Dual 50-Bit Static Shift Register	MC1161G	-55 to +85°C	602A	Operating frequency = dc to 2.0 MHz, non-inverting buffered outputs, independent input/output lines.
Frequency Divider	MC1180L	0 to +70°C	632	Six stages of binary division; particularly suited for tone generation in electronic organs.
Resettable Rhythm Counter	MC1181L	0 to +70°C	620	Asynchronous binary counter designed for driving the count-address inputs of a rhythm generator.
Rhythm Pattern Generator	MC1182L	0 to +70°C	684	Provides 2048 bits of Read Only Memory capability, arranged to generate eight rhythm patterns for triggering eight rhythm instruments in electronic organ applications. The rhythm patterns are specified by the user.
Frequency Synthesizer	MC1183L	0 to +70°C	632	Provides the C9 thru G8 and C8 portions of the top octave synthesizer function for tone generation in electronic organ applications.
Frequency Synthesizer	MC1184L	0 to +70°C	632	Provides the F#8 thru C#8 portion of the top octave synthesizer function for tone generation in electronic organ applications.
General-Purpose Logic Element	MC2255L	0 to +75°C	632	Can be externally connected to form a variety of NAND, NOR, and functional gate configurations.
Terminal Transmitter	MC2257L	0 to +75°C	684	Synchronous/asynchronous data communications adapter. Accepts parallel binary data in the form of characters and serially transmits the data to a modem.

(continued)



## FUNCTIONS AND CHARACTERISTICS (continued)

Function	Type	Temperature	Case	Comments
Terminal Receiver	MC2259L	0 to +75°C	695	Synchronous/asynchronous data communications adapter that receives serial digital data from a modem, organizes the data into fixed word lengths corresponding to characters, and transfers these characters to a buffer register from which the character may be accessed in a parallel format.
2048-Bit Read Only Memory	MCM1110L	-25 to +85°C	684	Mask-programmable static ROM; may be organized as 512 words of 4 bits or 256 words of 8 bits. Output devices may be open drain for use with TTL devices or with pulldown resistors for use with other MOS devices.
2048-Bit Hollerith-to-ASCII Converter	MCM1111L	-25 to +85°C	684	Pre-programmed MCM1110L; 256 words of 8 bits, pulldown resistors in output buffer for compatibility with MOS devices.
2048-Bit Hollerith-to-ASCII Converter	MCM1112L	-25 to +85°C	684	Same as MCM1111L except open-drain output buffers for TTL compatibility.
2240-Bit Read Only Memory	MCM1120L	-25 to +85°C	684 or 695	Mask-programmable static character generator ROM; 64 characters of 35 bits (5X7), seven address inputs, three row select inputs, and chip enable input. Open-drain or push-pull output buffers.
2240-Bit Row Select USASCII Character Generator	MCM1121L	-25 to +85°C	695	Pre-programmed MCM1120L; push-pull output buffers are MOS compatible.
2240-Bit Row Select USASCII Character Generator	MCM1122L	-25 to +85°C	695	Same as MCM1121L except open-drain output buffers that sink 1.6 mA minimum for TTL and DTL compatibility; can be wire ORed for memory expansion.
2240-Bit Read Only Memory	MCM1130L	-25 to +85°C	684 or 695	Mask-programmable static character generator ROM; 64 characters of 35 bits (5X7) or 32 characters of 70 bits (5X14), seven address inputs, five column select inputs, and chip enable input. Open-drain output buffers for TTL compatibility.
2240-Bit Column Select USASCII Character Generator	MCM1131L	-25 to +85°C	684	Pre-programmed MCM1130L; 64 characters of 35 bits (5X7).
2240-Bit Column Select USASCII Character Generator	MCM1132L	-25 to +85°C	695	Same as MCM1131L except only six address inputs and different package.
4096-Bit Read Only Memory	MCM1140L	-25 to +85°C	684	Mask-programmable static ROM; 512 words of 8 bits or 1024 words of 4 bits. Output buffers open-drain or with pulldown resistors.
4096-Bit Read Only Memory	MCM1141L	-25 to +85°C	684	Pre-programmed MCM1140L; 512 words of 8 bits, open-drain output buffers.
2560-Bit Read Only Memory	MCM1150L	-25 to +85°C	684	Mask-programmable static ROM; 512 words of 5 bits or 256 words of 10 bits. Output buffers open-drain or with pulldown resistors.
2560-Bit Read Only Memory	MCM1151L	-25 to +85°C	684	Pre-programmed MCM1150L; 256 words of 10 bits, open-drain output buffers, programmed for ASCII-to-Selectric and Selectric-to-ASCII code conversion.
1024-Bit Dynamic Random Access Memory	MCM1172L	0 to +70°C	694	Organized as 1024 one-bit words; power dissipation = 75 $\mu$ W/bit, access time $\leq$ 350 ns, read cycle time $\geq$ 535 ns, write cycle time $\geq$ 860 ns.
1024-Bit Dynamic Random Access Memory	MCM1173L	0 to +70°C	684	Same as MCM1172L except package.
1024-Bit Dynamic Random Access Memory	MCM1175L	0 to +70°C	677	Organized as 1024 one-bit words; access time = 150 ns typ, read cycle time = 250 ns typ, write cycle time = 250 ns typ.

Selectric is a registered trademark of IBM



McMOS

## INTEGRATED CIRCUITS

McMOS

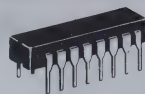
## MC14000 and MC14500 Series Complementary MOS

The McMOS series of monolithic integrated logic circuits is designed to provide the system design engineer with a medium-speed integrated circuit family which approaches the ideal in performance. The low power dissipation and flexible power supply requirements of this family of devices greatly simplify power supply design, and the high noise immunity and large fanout capability reduce parts count and simplify printed circuit board layout.

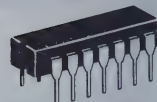
All devices may also be obtained in chip form for the manufacturer of hybrid microcircuits.

## FEATURES

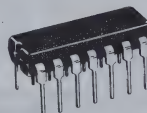
- Quiescent Power Dissipation = 10 nW/pkg typical for Gates
- High Noise Immunity = 45% of  $V_{DD}$  typical
- Supply Voltage Range = 3.0 Vdc to 18 Vdc (AL Series)  
= 3.0 Vdc to 16 Vdc (CL, CP Series)
- Single or Multiple Supply Operation – Positive or Negative
- Fanout – > 50
- Output Logic Excursion Independent of Fanout
- Diode Protection on All Inputs



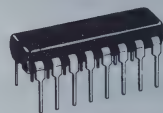
L SUFFIX  
CERAMIC PACKAGE  
CASE 620



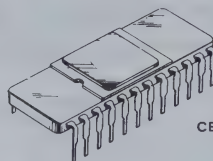
L SUFFIX  
CERAMIC PACKAGE  
CASE 632  
TO-116



P SUFFIX  
PLASTIC PACKAGE  
CASE 646  
TO-116



P SUFFIX  
PLASTIC PACKAGE  
CASE 648



L SUFFIX  
CERAMIC PACKAGE  
CASE 684

## FUNCTION AND CHARACTERISTICS

Function	Type		Quiescent Power Dissipation nW typ/pkg		Propagation	
	VDD = 18 Vdc -55 to +125°C	VDD = 16 Vdc -40 to +85°C	Series		Delay ns typ	Case
			AL	CL/CP		
Dual 3-Input NOR Gate/Inverter	MC14000AL	MC14000CL/CP	10	50	25	632,646
Quad 2-Input NOR Gate	MC14001AL	MC14001CL/CP	10	50	25	632,646
Dual 4-Input NOR Gate	MC14002AL	MC14002CL/CP	10	50	25	632,646
18-Bit Static Shift Register	MC14006AL	MC14006CL/CP	50	200	80	632,646
Dual Pair and Inverter	MC14007AL	MC14007CL/CP	10	50	15	632,646
4-Bit Full Adder	MC14008AL	MC14008CL/CP	1000	1000	170	620,648
Hex Inverter/Buffer	MC14009AL	MC14009CL/CP	100	500	9.0	620,648
Hex Noninverting Buffer	MC14010AL	MC14010CL/CP	100	500	20	620,648
Quad 2-Input NAND Gate	MC14011AL	MC14011CL/CP	10	50	25	632,646
Dual 4-Input NAND Gate	MC14012AL	MC14012CL/CP	10	50	25	632,646
Dual Type D Flip-Flop	MC14013AL	MC14013CL/CP	50	200	80	632,646
Dual 4-Bit Static Shift Register	MC14015AL	MC14015CL/CP	10 $\mu$ W	10 $\mu$ W	125	620,648
Quad Analog Switch/Quad Multiplexer	MC14016AL	MC14016CL/CP	200	200	7.0	632,646
Decade Counter/Divider	MC14017AL	MC14017CL/CP	5.0 mW	10 mW	200	620,648
8-Bit Static Shift Register	MC14021AL	MC14021CL/CP	3000	3000	100	620,648
Triple 3-Input NAND Gate	MC14023AL	MC14023CL/CP	10	50	25	632,646
Triple 3-Input NOR Gate	MC14025AL	MC14025CL/CP	10	50	25	632,646
Dual J-K Flip-Flop	MC14027AL	MC14027CL/CP	50	200	75	620,648
BCD-To-Decimal Decoder/ Binary-To-Octal Decoder	MC14028AL	MC14028CL/CP	75	75	57	620,648
Triple Serial Adder (Positive Logic)	MC14032AL	MC14032CL/CP	1000	1000	90	620,648
8-Bit Static Bus Register	MC14034AL	MC14034CL	5000	5000	175	684
Triple Serial Adder (Negative Logic)	MC14038AL	MC14038CL/CP	1000	1000	90	620,648
12-Bit Binary Counter	MC14040AL	MC14040CL/CP	7500	7500	85	620,648
Triple Gate (Dual 4-Input NAND Gate and 2-Input NOR/OR Gate or 8-Input AND/NAND Gate)	MC14501AL	MC14501CL/CP	10	50	25	620,648
Strobed Hex Inverter/Buffer	MC14502AL	MC14502CL/CP	10	50	20	620,648
Dual Expandable AND-OR-INVERT Gate	MC14506AL	MC14506CL/CP	100	100	80	620,648
Quad Exclusive OR Gate	MC14507AL	MC14507CL/CP	10	50	35	632,646
Dual 4-Bit Latch	MC14508AL	MC14508CL	1000	1000	75	684
BCD Up/Down Counter	MC14510AL	MC14510CL/CP	1000	1000	100	620,648

(continued)



# McMOS INTEGRATED CIRCUITS (continued)

## FUNCTION AND CHARACTERISTICS (continued)

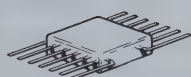
Function	Type		Quiescent Power Dissipation nW typ/pkg		Propagation Delay ns typ	Case
	V <sub>DD</sub> = 18 Vdc -55 to +125°C	V <sub>DD</sub> = 16 Vdc -40 to +85°C	Series			
			AL	CL/CP		
BCD To-Seven Segment Latch/Decoder/Driver	MC14511AL	MC14511CL/CP	100	100	250	620,648
8 Channel Data Selector	MC14512AL	MC14512CL/CP	500	500	75	620,648
4-Bit Latch/4 to 16 Line Decoder (High)	MC14514AL	MC14514CL	200	200	300	684
4 Bit Latch/4 to 16 Line Decoder (Low)	MC14515AL	MC14515CL	200	200	300	684
Binary Up/Down Counter	MC14516AL	MC14516CL/CP	1000	1000	40	620,648
Dual 64-Bit Static Shift Register	MC14517AL	MC14517CL	500	1000	180	620
Dual BCD Up Counter	MC14518AL	MC14518CL/CP	4000	4000	100	620,648
4 Bit AND/OR Selector (Quad 2-Channel Data Selector or Quad Exclusive NOR Gate)	MC14519AL	MC14519CL/CP	100	100	85	620,648
Dual Binary Up Counter	MC14520AL	MC14520CL/CP	4000	4000	100	620,648
Programmable Divide-By-N 4-Bit Counter (BCD)	MC14522AL	MC14522CL	1000	1000	100	620
Programmable Divide-By-N 4-Bit Counter (Binary)	MC14526AL	MC14526CL	1000	1000	100	620
BCD Rate Multiplier	MC14527AL	MC14527CL/CP	1000	1000	70	620,648
Dual Retriggerable/Resettable Monostable Multivibrator	MC14528AL	MC14528CL/CP	50	50	80	620,648
Dual 4-Channel Analog Data Selector	MC14529AL	MC14529CL/CP	250	250	—	620,648
Dual 5-Input Majority Logic Gate	MC14530AL	MC14530CL/CP	100	100	180	620,648
12 Bit Parity Tree	MC14531AL	MC14531CL/CP	100	100	140	620,648
4 Bit Arithmetic Logic Unit	MC14581AL	MC14581CL	100	100	225	684
Look-Ahead Carry Block	MC14582AL	MC14582CL/CP	100	100	115	620,648
64-Bit Random Access Read Write Memory	MCM14505AL	MCM14505CL	300	300	Read Cycle = 150 Write Cycle = 200	632
1024 Bit Read Only Memory	MCM14524AL	MCM14524CL	31	31	180	620



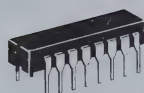
## LOGIC PRODUCTS

for

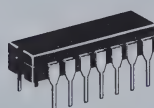
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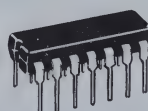
F SUFFIX  
CERAMIC PACKAGE  
CASE 607  
TO-86



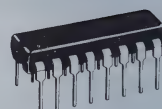
L SUFFIX  
CERAMIC PACKAGE  
CASE 620



L SUFFIX  
CERAMIC PACKAGE  
CASE 632  
TO-116



P SUFFIX  
PLASTIC PACKAGE  
CASE 646  
TO-116



P SUFFIX  
PLASTIC PACKAGE  
CASE 648

## FUNCTIONS AND CHARACTERISTICS

Function	Type				Family	Frequency MHz typ	Power Dissipation mW typ/pkg
	-55 to +125°C	Case	0 to +75°C	Case			
Emitter-Coupled Oscillator	—	—	MC1648	607, 632, 646	MECL	225	150
Voltage-Controlled Multivibrator	—	—	MC1658	620, 648	MECL	150	125
Dual Voltage-Controlled Multivibrator	MC4324	607, 632	MC4024	607, 632, 646	MTTL	30	150
Phase-Frequency Detector	MC4344	607, 632	MC4044	607, 632, 646	MTTL	8.0	85
Digital Mixer/Translator	—	—	MC12000	632	MECL	250	470
Programmable Modulo-N Decade Counter ( $\div 0$ thru 9)	MC54416 (Was MC4316)	620	MC74416 (Was MC4016)	620, 648	MTTL	8.0	250
Programmable Modulo-N Counter ( $\div 0, 1$ and $\div 0$ thru 4)	MC54417	620	MC74417	620, 648	MTTL	8.0	250
Programmable Modulo-N Hexadecimal Counter ( $\div 0$ thru 15)	MC54418 (Was MC4318)	620	MC74418 (Was MC4018)	620, 648	MTTL	8.0	250
Programmable Modulo-N Counter ( $\div 0$ thru 3 and $\div 0$ thru 3)	MC54419	620	MC74419	620, 648	MTTL	8.0	250

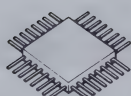


## SPECIAL BIPOLAR LOGIC PRODUCTS

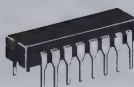
### for *CUSTOM* APPLICATIONS



**F SUFFIX**  
CERAMIC PACKAGE  
CASE 607  
TO-86



**CERAMIC PACKAGE**  
CASE 618



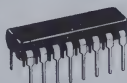
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620



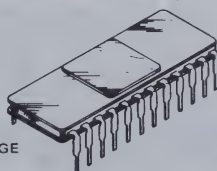
**L SUFFIX**  
CERAMIC PACKAGE  
CASE 632  
TO-116



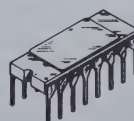
**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646  
TO-116



**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 684



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 690

(Additional mask-programmable memories are in the MOS device listing.)

Function	Type	Temperature	Case	Comments
128-Bit Read Only Memory (Formerly XC170,171)	MCM4000	0 to +75°C	620,648	Bipolar read only memory organized as 16 eight-bit words. Compatible with MDTL and all MTTL lines. Open collectors or 2.0 kilohm pullup resistors at buffered output bit lines. Truth table and output option specified by user.
	MCM4300	-55 to +125°C	620	
256-Bit Read Only Memory	MCM4002L	0 to +75°C	620	Bipolar read only memory organized as 32 eight-bit words. Compatible with MDTL and all MTTL lines. Open collectors or 2.0 kilohm pullup resistors at buffered output bit lines. Truth table and output option specified by user.
	MCM4002P	0 to +75°C	648	
1024-Bit Read Only Memory *	MCM4004AL	0 to +70°C	690	Bipolar read only memory organized as 256 four-bit words. Input loading of -0.25 mA maximum. Typical address time of 50 ns, typical chip select time of 25 ns. Open collectors or 2.0 kilohm pullup resistors at output bit lines. Truth table and output option specified by user.
1024-Bit Read Only Memory *	MCM4006AL	0 to +70°C	690	Same as MCM4004AL except input loading of -1.6 mA maximum, typical address time of 40 ns, typical chip select time of 20 ns.
512-Bit Programmable Read Only Memory	MCM5003AL	0 to +70°C	684	Bipolar programmable read only memory organized as 64 eight-bit words. Field programmable by "blowing" appropriate nichrome resistors to break metalization links. Ninth bit available for circuit testing. Open collector outputs.
	MCM5303AL	-55 to +125°C	684	
512-Bit Programmable Read Only Memory	MCM5004AL	0 to +70°C	684	Same as MCM5003AL except 2.0 kilohm pullup resistors on the collector outputs.
	MCM5304AL	-55 to +125°C	684	
25-Gate Array	XC177	-55 to +125°C	607	Twenty-five gates with two custom layers of metalization required to complete the circuit and obtain the desired function. Compatible with MDTL and all MTTL lines.
		0 to +75°C	618, 632, 646, 648	

\*Standard options of the MCM4004 and MCM4006 are available as MCM4067 and MCM4068 Binary-to-BCD Number Converters (from MCM4004) and MCM4069 and MCM4070 Hollerith-to-ASCII Converters (from MCM4006). Details are given on the MTTL Complex Functions device listing.



## OPERATIONAL AMPLIFIERS

Motorola offers a broad line of operational amplifiers to meet a wide range of usages. From low-cost, industry standard types to high precision circuits the span encompasses a large range of performance capabilities.

These linear integrated circuits are available as single, dual, and quad monolithic devices in a variety of package styles as well as standard and beam-lead chips.

### OPERATIONAL AMPLIFIERS

Listed in order of increasing input bias current within temperature group.

(See reverse side of sheet for dual and quad operational amplifiers and drivers.)

#### INTERNALLY COMPENSATED

I <sub>IB</sub> ( $\mu$ A max)	V <sub>IO</sub> (mV max)	I <sub>IO</sub> (nA max)	A <sub>vol</sub> (V/V min)	V <sub>O</sub> @ R <sub>L</sub> & V <sub>CC</sub> , V <sub>EE</sub> (V <sub>pk</sub> min) (k $\Omega$ )	f <sub>c</sub> (MHz typ)	BW <sub>p</sub> (kHz typ)	SR (V/ $\mu$ s typ)	Case	Type
<b>-55 to +125°C Temperature Range</b>									
0.015	4.0	2.0	100,000	12 2.0 $\pm 15$	1.0	40	2.5	601	MC1556
0.02	5.0	3.0	100,000	22 5.0 $\pm 28$	1.0	23	2.0	601	MC1536*
0.075	2.0	10	50,000	10 2.0 $\pm 15$	1.0	10	0.5	601	MLM107
0.5	5.0	200	50,000	10 2.0 $\pm 15$	1.0	10	0.8	601,606,632,665**	MC1741* **†

#### -25 to +85°C Temperature Range

0.003	4.0	—	Unity	10 10 $\pm 15$	20	300	30	601	MLM210
0.075	2.0	10	50,000	10 2.0 $\pm 15$	1.0	10	0.5	601	MLM207

#### 0 to +70°C Temperature Range

0.007	7.5	—	Unity	10 10 $\pm 15$	20	300	30	601	MLM310
0.03	10	10	70,000	11 2.0 $\pm 15$	1.0	40	2.5	601	MC1456
0.04	10	10	70,000	20 5.0 $\pm 28$	1.0	23	2.0	601	MC1436*
0.09	12	30	25,000	10 2.0 $\pm 15$	1.0	40	2.5	601	MC1456C
0.09	12	25	50,000	20 5.0 $\pm 28$	1.0	23	2.0	601	MC1436C
0.25	7.5	50	25,000	10 2.0 $\pm 15$	1.0	10	0.57	601	MLM307
0.5	6.0	200	20,000	10 2.0 $\pm 15$	1.0	10	0.8	601,606,626,632,646	MC1741C*†

#### NONCOMPENSATED

I <sub>IB</sub> ( $\mu$ A max)	V <sub>IO</sub> (mV max)	I <sub>IO</sub> (nA max)	A <sub>vol</sub> (V/V min)	V <sub>O</sub> @ R <sub>L</sub> & V <sub>CC</sub> , V <sub>EE</sub> (V <sub>pk</sub> min) (k $\Omega$ )	f <sub>c</sub> (MHz typ)	BW <sub>p</sub> (kHz typ)	SR (V/ $\mu$ s typ)	Case	Type
<b>-55 to +125°C Temperature Range</b>									
0.075	2.0	10	50,000	10 2.0 $\pm 15$	1.0	10	0.5	601	MLM101A
0.15	10	25	2,500	4.5 1.0 $\pm 6.0$	2.0	100	1.4	602B,606	MC1531
0.5	3.0	60	50,000	10 1.0 $\pm 15$	2.0	50	4.2	601,632	MC1539*
0.5	5.0	200	50,000	10 2.0 $\pm 15$	1.0	10	0.8	601,606**	MC1748* **
0.5	5.0	200	25,000	10 2.0 $\pm 15$	0.5	4.0	0.25	601,606,632,665**	MC1709* **†
1.0	5.0	150	40,000	11 2.0 $\pm 15$	0.8	2.0	2.0	602B,606,632	MC1533
2.0	10	100	1,000	3.5 7.0 $\pm 6.0$	10	150	5.0	602A,606	MC1520
5.0	2.0	500	2,500	3.5 10 $+12, -6.0$	7.0	10	1.5	601,606,632	MC1712
10	5.0	2000	4,500	4.5 1.0 $\pm 6.0$	3.0	100	1.7	602B,606	MC1530

#### -25 to +75°C Temperature Range

0.075	2.0	10	50,000	10 2.0 $\pm 15$	1.0	10	0.5	601	MLM201A
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#### 0 to +75°C Temperature Range

0.25	7.5	50	25,000	10 2.0 $\pm 15$	1.0	10	0.5	601,626	MLM301A
0.3	15	100	1,500	4.0 1.0 $\pm 6.0$	2.0	100	1.4	602B,606,646	MC1431
0.5	6.0	200	20,000	10 2.0 $\pm 15$	1.0	10	0.8	601	MC1748C*
1.0	7.5	100	15,000	10 2.0 $\pm 15$	2.0	50	4.2	601,632,646	MC1439*
1.5	7.5	500	15,000	10 2.0 $\pm 15$	0.5	4.0	0.25	601,606,626,632,646	MC1709C*†
2.0	7.5	500	30,000	10 2.0 $\pm 15$	0.8	2.0	2.0	602B,606,632,646	MC1433
4.0	15	200	750	3.0 7.0 $\pm 6.0$	10	150	5.0	602A,606	MC1420
7.5	5.0	2000	2,000	3.5 10 $+12, -6.0$	7.0	10	1.5	601,606,632	MC1712C
15	10	4000	3,000	4.0 1.0 $\pm 6.0$	3.0	100	1.7	602B,606,646	MC1430

\*Use MCC prefix for nonencapsulated chip.

\*\*Use MCBC prefix for nonencapsulated beam-lead device, use MCB prefix for beam-lead device in flat ceramic package.

†Use MCCF prefix for nonencapsulated flip-chip.

#### DEFINITIONS

SR	Slew Rate @ Unity Gain	A <sub>vol</sub>	Open-Loop Voltage Gain
V <sub>IO</sub>	Input Offset Voltage	V <sub>O</sub>	Output Voltage Swing
I <sub>IB</sub>	Input Bias Current	f <sub>c</sub>	Unity Gain Crossover Frequency
I <sub>IO</sub>	Input Offset Current	BW <sub>p</sub>	Power Bandwidth



DUAL OPERATIONAL AMPLIFIERS

Listed in increasing order of input bias current.

INTERNALLY COMPENSATED

I <sub>IB</sub> (μA max)	V <sub>IO</sub> (mV max)	I <sub>IO</sub> (nA max)	A <sub>vol</sub> (V/V min)	V <sub>O</sub> @ (V <sub>pk</sub> min)	R <sub>L</sub> & V <sub>CC</sub> , V <sub>EE</sub> (kΩ) (Vdc)	f <sub>c</sub> (MHz typ)	BW <sub>p</sub> (kHz typ)	SR (V/μs typ)	Case	Type
-55 to +125°C Temperature Range										
0.5	5.0	200	50,000	10	2.0 ±15	1.1	14	0.8	601,632	MC1558*†
0.5	5.0	200	50,000	10	2.0 ±15	1.0	10	0.5	632	MC1747
0 to +75°C Temperature Range										
0.5	6.0	200	20,000	10	2.0 ±15	1.1	14	0.8	601,626,632,646	MC1458*†
0.5	6.0	200	25,000	10	2.0 ±15	1.0	10	0.5	632	MC1747C
0.7	10	300	20,000	9.0	2.0 ±15	1.1	14	0.8	601,626,632,646	MC1458C

\*Use MCC prefix for nonencapsulated chip.

†Use MCCF for nonencapsulated flip-chip.

NONCOMPENSATED

I <sub>IB</sub> (μA max)	V <sub>IO</sub> (mV max)	I <sub>IO</sub> (nA max)	A <sub>vol</sub> (V/V min)	V <sub>O</sub> @ (V <sub>pk</sub> min)	R <sub>L</sub> & V <sub>CC</sub> , V <sub>EE</sub> (kΩ) (Vdc)	f <sub>c</sub> (MHz typ)	BW <sub>p</sub> (kHz typ)	SR (V/μs typ)	Case	Type
-55 to +125°C Temperature Range										
0.5	5.0	200	25,000	12	10 ±15	1.0	3.0	0.25	632	MC1537
3.0	3.0	300	4,000	2.5	10 ±6.0	1.0	40	0.013	602B,607,632	MC1535
0 to +75°C Temperature Range										
1.5	7.5	500	15,000	12	10 ±15	1.0	3.0	0.25	632,646	MC1437
5.0	5.0	500	3,500	2.3	10 ±6.0	1.0	40	0.013	602B,607,632,646	MC1435

QUAD OPERATIONAL AMPLIFIERS

Internally Compensated  
...for automotive applications

I <sub>IB</sub> (μA max)	V <sub>IO</sub> (mV max)	I <sub>IO</sub> (nA max)	A <sub>vol</sub> (V/V min)	V <sub>O</sub> @ (V <sub>pk</sub> min)	R <sub>L</sub> & V <sub>CC</sub> , V <sub>EE</sub> (Ω) (Vdc)	f <sub>c</sub> (MHz typ)	BW <sub>p</sub> (kHz typ)	SR (V/μs typ)	Case	Type
0.3	—	—	1,000	10	5.0 +15	4.0	20	0.6	646	MC3301
...for industrial applications										
0.3	—	—	1,000	10	5.0 +15	5.0	20	0.6	646	MC3401

POWER DRIVERS

INTERNALLY COMPENSATED

I <sub>IB</sub> (μA max)	V <sub>IO</sub> (mV max)	I <sub>IO</sub> (nA max)	A <sub>vol</sub> (V/V min)	V <sub>O</sub> @ (V <sub>pk</sub> min)	R <sub>L</sub> & V <sub>CC</sub> , V <sub>EE</sub> (Ω) (Vdc)	f <sub>c</sub> (MHz typ)	BW <sub>p</sub> (kHz typ)	SR (V/μs typ)	Case	Comments	Type
-55 to +125°C Temperature Range											
200	—	—	900	12	300 ±15	—	1500	75	614	High current gain (70 dB) op ampl power booster I <sub>O</sub> = 300 mA max	MC1538
0 to +75°C Temperature Range											
300	—	—	850	11	300 ±15	—	1500	75	614	High current gain (70 dB) op ampl power booster, I <sub>O</sub> = 300 mA max	MC1438



## INTERFACE CIRCUITS

Interface circuits fit in the gray area between the linear and digital realms. Usually these IC's perform the necessary translation between an analog signal input and the required digital logic levels or vice versa. To aid in

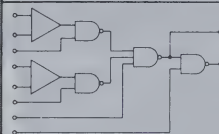
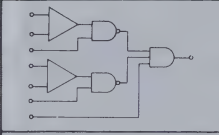
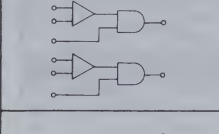
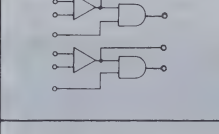
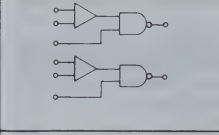
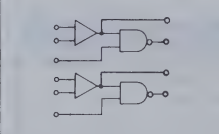
selection, the devices have been divided into five main categories: Sense Amplifiers, Drivers, D/A Converters, Receivers, and Comparators.

### SENSE AMPLIFIERS

The sense amplifiers listed provided the necessary translation from the outputs of core or plated-wire memories to M TTL (unless otherwise noted) logic levels. Unless noted, all devices are designed to operate from

±5.0 volt power supplies. The output of these sense amplifiers changes logic states when the differential input voltage exceeds a specified threshold level, regardless of input polarity.

#### CORE MEMORY

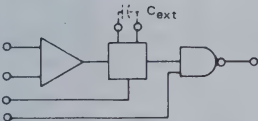
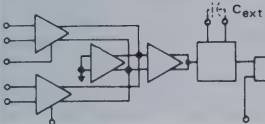
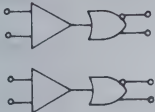
Function	Threshold Voltage (mV) @ $V_{ref}$ (mV)		Propagation Delay (ns max)	Case	Type		
	min	max			-55 to +125°C	0 to +70°C	
	11 36	19 44	15 40	55	620	—	MC7520
	8.0 33	22 47	15 40	55	620	—	MC7521
	11 36	19 44	15 40	45	620	—	MC7522
	8.0 33	22 47	15 40	45	620	—	MC7523
	11 36	19 44	15 40	40	620	—	MC7524
	8.0 33	22 47	15 40	40	620	—	MC7525
	11 36	19 44	15 40	40	620, 648*	—	MC7528
	10 35	20 45	15 40	40	620	MC5528	—
	8.0 33	22 47	15 40	40	620, 648*	MC5529	MC7529
	11 36	19 44	15 40	40	620, 648*	—	MC7534
	10 35	20 45	15 40	40	620	MC5534	—
	8.0 33	22 47	15 40	40	620, 648*	MC5535	MC7535
	11 36	19 44	15 40	40	620, 648*	—	MC7538
	10 35	20 45	15 40	40	620	MC5538	—
	8.0 33	22 47	15 40	40	620, 648*	MC5539	MC7539

\*Case 648 used with commercial-temperature-range devices only.

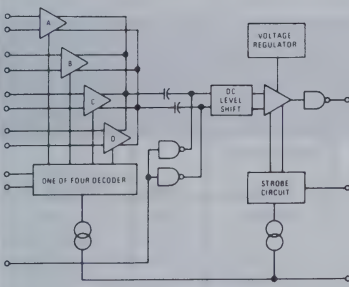


INTERFACE CIRCUITS (Continued)

SENSE AMPLIFIERS (continued)  
CORE MEMORY (Continued)

Function	Threshold Voltage @ $V_{ref}$ (mV)		$V_{ref}$ (mV)	Propagation Delay (ns max)	Case	Type	
	min	max				-55 to +125°C	0 to +75°C
 <p>0.5μs cycle time, 20ns typ response time, ±6.0V power supply</p>	14	20	-6.0V	30	602B, 606, 632	MC1540	MC1440
 <p>0.4μs cycle time, 1.5V common-mode inputs, 1.0mV typ input offset</p>	14	20	-5.0V	30	607, 632	MC1541	MC1441
 <p>Compatible with MECL, +5.0V, -5.2V power supplies, threshold insensitive to supply variations, complementary outputs</p>	17	23	540	35	632	MC1543	—

PLATED-WIRE MEMORIES

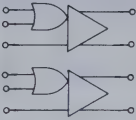
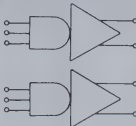
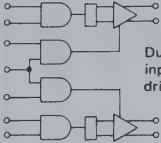

Function	Threshold Voltage (mV — typ)	Propagation Delay (ns — max)	Case	Type	
				-55 to +125°C	0 to +75°C
 <p>AC-coupled, decoded input channel selection, wired-OR output capability, output strobe capability, +5.0V, -6.0V power supply</p>	1.0	25	620	MC1544	MC1444



# DRIVERS

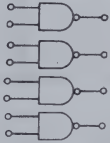
Several types of interface drivers are tabulated in this section: twisted-pair drivers for transmitting data over long lines, RS-232 drivers for interfacing modems and terminals, peripheral drivers for driving lamps, relays and memories, and MOS clock drivers for providing the required clock pulses to highly-capacitive loads.

## TWISTED-PAIR LINE DRIVERS

Function	Compatibility	$I_O(\text{on})$ mA (min/max)	$I_O(\text{off})$ $(\mu\text{A} - \text{max})$	$t_{PLH}/t_{PHL}$ Input to Output (ns - typ)	Case	Type	
						-55 to +125°C	0 to +70°C
 <p>Dual Driver/Receiver with MECL Bias Supply</p>	MDTL, MECL, MRTL	6.9/10.4	5.0	13/13	632	MC1580	-
 <p>Dual 3-Input Driver</p>	MDTL, MTTL, MRTL	6.9/10.4	5.0	15/13	632	MC1582	-
 <p>Dual Driver with inhibit inputs for party-line driver applications</p>	MTTL	3.5/7.0  6.5/15	100  100	9.0/9.0  9.0/9.0	632, 646  632, 646	-  -	MC75109  MC75110
 <p>Differential Party-Line Driver with push-pull outputs</p>	MDTL	18/26	-	25/15	632	-	MC75113†

† 0 to +75°C Temperature Range

## RS-232 LINE DRIVER

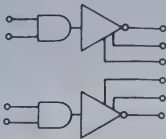

Function	Compatibility	$V_{OL}$ Vdc min	& $V_{OH}$ Vdc min	& $V_{CC}$ Vdc	& $V_{EE}$ Vdc	$t_{PLH}/t_{PHL}$ ns typ	Case	Type 0 to +75°C
 <p>Quad Line Driver</p>	MDTL, MTTL	-6.0 -9.0	+6.0 +9.0	+9.0 +13.2	-9.0 -13.2	150/65*	632	MC1488

\* @ 3000 ohms, 15 pF

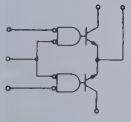
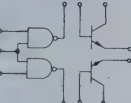
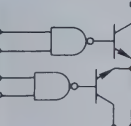


INTERFACE CIRCUITS (Continued)

DRIVERS (continued)  
MOS CLOCK DRIVERS

Function	Input Compatibility	PRR (max) $C = 1000\text{ pF} @ V_{CC}/V_{EE}$ (volts)		Switching Times $C = 1000\text{ pF, ns-typ}$				Temperature (°C)	Case	Type
				$t_{PLH}$	$t_{TLH}$	$t_{PHL}$	$t_{THL}$			
Dual MOS Clock Driver with Strobe 	MDTL,MTTL	2.0 MHz	5.0/-20	55	50	25	22	-55 to +125	632	MC1585
High-Speed Hybrid MOS Clock Driver 	MTTL	4.0 MHz	5.0/-12	13	40	23	35	0 to +70	646	MHP 401

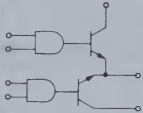
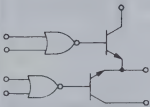
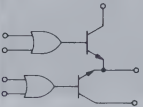
PERIPHERAL DRIVERS

Function	Compatibility	$I_{O(on)}$ (mA - max)	$t_{PLH}/t_{PHL}$ Input to Output (ns - typ)	Case	Type	
					-55 to +125°C	0 to +70°C
Dual Memory Driver with logic inputs, 24-volt output capability 	MDTL,MTTL	600	25/25 (to source collectors) 20/20 (to sink outputs)	620, 648#	MC55325	MC75325
Dual Peripheral Positive AND Driver, plus two noncommitted NPN output transistors 	MDTL,MTTL	300*	21/16	632 646	-	MC75450
Dual Peripheral Positive AND Driver with logic gate outputs internally connected to NPN output transistors 	MDTL,MTTL	300*	17/18	626	-	MC75451

#Case 648 used with industrial-temperature-range devices only.  
\*Each transistor



DRIVERS (continued)  
PERIPHERAL DRIVERS (continued)

Function	Compatibility	$I_{O(on)}$ (mA – max)	$t_{PLH}/t_{PHL}$ Input to Output (ns – typ)	Case	Type	
					-55 to +125°C	0 to +70°C
 Dual positive NAND driver with logic gate outputs internally connected to NPN output transistors	MDTL, MTTL	300*	18/16	626	—	MC75452
 Dual positive OR Driver with logic gate outputs internally connected to NPN output transistors	MDTL, MTTL	300*	12/17	626	—	MC75453
 Dual positive NOR Driver with logic gate output internally connected to NPN output transistors	MDTL, MTTL	300*	25/19	626	—	MC75454

\*Each Transistor

D/A CONVERTERS

The low-cost D/A converters described here find wide usage in communications, control, and instrumentation systems. They provide a current output which is the product of a digital word and an analog reference voltage.

DIGITAL-TO-ANALOG CONVERTERS

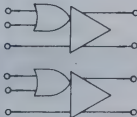
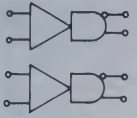
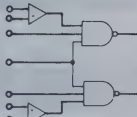
Function	Compatibility	$E_r$ (% – max)	$I_O$ (mA – max)	$t_S$ (ns – typ)	$t_p$ (ns – max)	Case	Type	
							-55 to +125°C	0 to +70°C
6-Bit Multiplying Digital-to-Analog Converters	MDTL, MTTL	±0.78	2.1	200	150	632	MC1506	MC1406
8-Bit Multiplying Digital-to-Analog Converters	MDTL, MTTL	±0.19	2.1	300	100	620	MC1508L8	MC1408L8
		±0.39	2.1	300	100	620	—	MC1408L7
		±0.78	2.1	300	100	620	—	MC1408L6



RECEIVERS

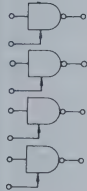
Mating with the driver types listed in the previous section are the receivers tabulated in this section: twisted-pair receivers for computer applications, and RS-232 receivers to interface with similar drivers.

TWISTED-PAIR LINE RECEIVERS

Function	Compatibility	Input Threshold (mV – typ)	Input Common Mode Range (V – min)	t <sub>PLH</sub> /t <sub>PHL</sub> Input to Output (ns – typ)	Case	Type		
						-55 to +125°C	0 to +70°C	
 Dual Driver/Receiver with MECL Bias Supply	MDTL, MECL, MRTL, MTTL	±40	±3.5	13/13	632	MC1580	—	
 Dual Line Receiver	MECL	±10	±3.5	15/25	632	MC1581	—	
	Open Collector Outputs	MDTL, MRTL, MTTL	±2.0	±3.5	24/34	632	MC1583	—
	Active Pullup	MDTL, MTTL	±40	±3.5	32/28	632	MC1584	—
 Dual Line Receiver with strobe inputs	Active Pullup	MTTL	±25	±3.0	17/17	632, 646#	MC55107 MC75107	
	Open Collector Output	MTTL	±25	±3.0	19/19	632, 646#	MC55108 MC75108	

#Case 646 used with industrial-temperature-range devices only.

RS-232 LINE RECEIVERS

Function	Compatibility	Input Turn-On Threshold (V <sub>dc</sub> – max)	Input Turn-Off Threshold (V <sub>dc</sub> – max)	Input Hysteresis (mV – typ)	t <sub>PLH</sub> /t <sub>PHL</sub> (ns – typ)	Case	Type 0 to +75°C
 Quad Line Receiver	MDTL, MTTL	1.5	1.25	250	25/25	632	MC1489
	MDTL, MTTL	2.25	1.25	1150	25/25	632	MC1489A



COMPARATORS

A comparator provides a logical output in response to the polarity of the differential voltage applied to the inputs of the device. All comparators shown are intended for operation from +12 V and -6.0 V power supplies, and interface to saturated logic levels. Maximum differential input voltage is  $\pm 5.0$  V and propagation delay time is 40 ns for all device types shown.

A <sub>Vol</sub> (V/V min)	V <sub>IO</sub> (mVdc max)	I <sub>IB</sub> (μAdc max)	V <sub>OH</sub> (Vdc)		V <sub>OL</sub> (Vdc)		I <sub>O</sub> s (mAdc min)	t <sub>p</sub> (ns typ)	Case	Type	Features
			min	max	min	max					
-55 to +125°C Temperature Range											
1,250	2.0	20	2.5	4.0	-1.0	0	2.0	40	601,606,632	MC1710* **	Output impedance = 200 ohms
1,250	2.0	20	2.5	4.0	-1.0	0	2.8	40	632	MC1514	Dual, strobe capability
750	3.5	75	2.5	5.0	-1.0	0	0.5	40	603-02,606,632	MC1711*	Dual with outputs wired OR, strobe capability

0 to +75°C Temperature Range

1,000	5.0	25	2.5	4.0	-1.0	0	1.6	40	601,606,632,646	MC1710C*	Output impedance = 200 ohms
1,000	5.0	25	2.5	4.0	-1.0	0	1.6	40	632,646	MC1414	Dual, strobe capability
700	5.0	100	2.5	5.0	-1.0	0	0.5	40	603-02,606,632,646	MC1711C*	Dual with outputs wired OR strobe capability

QUAD COMPARATOR

$V_{IO}$ (mVdc max)	$I_{IB}$ ( $\mu$ Adc max)	$V_{OL}$ (Vdc max)	Output Leakage Current ( $\mu$ A max)	$I_{Os}$ (mAdc typ)	$V_{IDR}$ (Vdc max)	Case	Type
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-40 to +85°C Temperature Range

20	0.5	0.4	10	5.0	$\pm V_{CC}$	646	MC3302
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Features

These comparators are designed specifically for single positive-power-supply operation from +2.0 to +28 Vdc. Each monolithic device contains four independent comparators, yet total package power supply current drain is 1.5 mA max.

\*Use MCC prefix for nonencapsulated chip.  
\*\*Use MCBC prefix for nonencapsulated beam-lead device; use MCB prefix for beam-lead device in ceramic flat package.

DEFINITIONS

$A_{vol}$	Open-Loop Voltage Gain	$V_{OH}$	Positive Output Voltage
$V_{ID}$	Differential Voltage Range	$V_{OL}$	Negative Output Voltage
$V_{IO}$	Input Offset Voltage	$I_{Os}$	Output Sink Current
$I_{IB}$	Input Bias Current	$t_p$	Propagation Delay Time



HIGH-FREQUENCY AMPLIFIERS

Motorola's high-frequency amplifiers simplify the design of receivers and signal processors. Many offer AGC capability or several gain options to provide extra design flexibility.

HIGH-FREQUENCY AMPLIFIERS

Bandwidth (MHz)	V <sub>OS</sub> (V <sub>p-p</sub> )	z <sub>in</sub>   (kΩ @ kHz)		z <sub>o</sub>   (Ω @ kHz)		A <sub>VS</sub> (dB)	G <sub>p</sub> @ 60 MHz (dB)	Diff. Input and Output	AGC	V <sub>CC</sub> , V <sub>EE</sub> (Vdc)	Case	Type	
												-55 to +125°C	0 to +75°C
dc to 40	4.5	6.0	20	35	20	90 (fixed)	—	Yes	No	±6.0	601	MC1510	MC1410
dc to 75	2.5	10	50	25	50	18 (fixed)	—	Yes	Yes	±5.0	602A, 607, 632	MC1545	MC1445
22 min	6.0	1.8	1.0 M	100 k	1.0 M	26 (AGC = 0)	25	No	Yes	+6.0	602B, 606	MC1550	—
40 @ A <sub>V</sub> = 34 dB 35 @ A <sub>V</sub> = 40 dB	4.2	10	100	16	100	30 – 40 (fixed)	—	No	No	+6.0	602B	MC1552	—
35 @ A <sub>V</sub> = 46 dB 15 @ A <sub>V</sub> = 52 dB	4.2	10	100	16	100	46 – 52 (fixed)	—	No	No	+6.0	602B	MC1553	—
100 @ A <sub>V</sub> = 4.0 dB 60 @ A <sub>V</sub> = 25 dB	7.0	3.0	1.0 M	100 k	1.0 M	44 (AGC = 0)	45	Yes	Yes	+12	601	MC1590	—
40 @ A <sub>V</sub> = 52 dB 90 @ A <sub>V</sub> = 40 dB 120 @ A <sub>V</sub> = 20 dB	4.0	4.0 30 250	1.0 1.0 1.0	20	1.0	52 40 20	—	Yes	No	±6.0	603-02 632	MC1733	MC1733C



## REGULATORS

Motorola offers a broad line of voltage regulators ranging from low-cost "Functional Circuits" to high-precision units. Regulators for positive and negative voltages are available as well as a unique floating

regulator, type MC1566L, whose maximum output voltage and current are limited only by the external pass transistor.

### POSITIVE VOLTAGE REGULATORS

V <sub>O</sub> V <sub>Dc</sub>		I <sub>O</sub> (mA dc max)	V <sub>in</sub> -V <sub>O</sub>   (V <sub>Dc</sub> )		V <sub>in</sub> (V <sub>Dc</sub> )		I <sub>JB</sub> (mA dc max)	Reg <sub>in</sub> %V <sub>O</sub> /V <sub>in</sub> (max)	Reg <sub>L</sub> (%V <sub>O</sub> max)	P <sub>D</sub> (W max)		Case	Type
min	max		min	max	min	max				T <sub>C</sub> = 25°C	T <sub>A</sub> = +25°C		
-55 to +125°C Temperature Range													
4.5	40	20	3.0	30	8.5	50	2.0	0.06	0.05 mV	—	0.68	601	MLM105
2.5	37	200 500	2.7	40	8.5	40	9.0	0.015	0.13 0.05	1.8 17.5	0.68 3.0	602A 614	MC1569*
2.5	37	200 500	2.7	40	8.5	40	9.0	0.015	0.13 0.05	1.8 17.5	0.68 3.0	602A 614	MC1561
2.5	17	200 500	2.7	20	8.5	20	9.0	0.015	0.13 0.05	1.8 12	0.68 3.0	602A 614	MC1560
2.0	37	150	3.0	38	9.5	40	3.5	0.030	0.15	—	0.8	603-03, 632,607**	MC1723* **
-25 to +85°C Temperature Range													
4.5	40	20	3.0	30	8.5	50	2.0	0.06	0.05 mV	—	0.68	601	MLM205
-10 to +75°C Temperature Range													
4.6	32	200	3.0	—	9.0	35	—	0.03	0.2	—	1.0	206A	MFC4060A
4.6	32	200	3.0	—	9.0	35	—	0.03	0.2	—	1.0	643A	MFC6030A
4.6	32	200	3.0	—	9.0	35	—	0.06	0.4	—	1.0	206A	MFC4062A
4.6	32	200	3.0	—	9.0	35	—	0.06	0.4	—	1.0	643A	MFC6032A
4.6	17	200	3.0	—	9.0	20	—	0.03	0.2	—	1.0	206A	MFC4063A
4.6	17	200	3.0	—	9.0	20	—	0.03	0.2	—	1.0	643A	MFC6033A
4.6	17	200	3.0	—	9.0	20	—	0.06	0.4	—	1.0	206A	MFC4064A
4.6	17	200	3.0	—	9.0	20	—	0.06	0.4	—	1.0	643A	MFC6034A
0 to +70°C Temperature Range													
4.5	30	20	3.0	30	8.5	40	2.0	0.06	0.05 mV	—	0.68	601	MLM305
2.5	32	200 500	3.0	35	9.0	35	12	0.030	0.13 0.05	1.8 17.5	0.68 3.0	602A 614	MC1469*
2.5	32	200 500	3.0	35	9.0	35	12	0.030	0.13 0.05	1.8 17.5	0.68 3.0	602A 614	MC1461
2.5	17	200 500	3.0	20	9.0	20	12	0.030	0.13 0.05	1.8 12	0.68 3.0	602A 614	MC1460
2.0	37	150	3.0	38	9.5	40	4.0	0.030	0.20	—	0.8	603-03, 632	MC1723C*

\*Also available as nonencapsulated chip; use MCC prefix.

\*\*Also available as nonencapsulated beam-lead device; use MCBC prefix, use MCB prefix for device in ceramic flat package.

### FIXED OUTPUT POSITIVE VOLTAGE REGULATORS

V <sub>O</sub> (V <sub>Dc</sub> )		I <sub>O</sub> (mA <sub>Dc</sub> max)	V <sub>in</sub> -V <sub>O</sub>   (V <sub>Dc</sub> )		V <sub>in</sub> (V <sub>Dc</sub> )		I <sub>JB</sub> (mA <sub>Dc</sub> max)	Reg <sub>in</sub> (mV max)	Reg <sub>L</sub> (mV max)	P <sub>D</sub> (W max)		Case	Type
min	max		min	max	min	max				T <sub>C</sub> = +25°C	T <sub>A</sub> = +25°C		
-55 to +150°C Junction Temperature Range													
4.7	5.3	1000	2.0	30	7.0	35	10	50	100	20	3.5	11	MLM109K
-25 to +125°C Junction Temperature Range													
4.7	5.3	1000	2.0	30	7.0	35	10	50	100	20	3.5	11	MLM209K
0 to +125°C Junction Temperature Range													
4.8	5.2	1000	2.0	30	7.0	35	10	50	100	20	3.5	11	MLM309K
4.8	5.2	1500	2.0	30	7.0	35	8.0	100	100	15	2.0	199-04	MC7805C
5.75	6.25	1500	2.0	29	8.0	35	8.0	120	120	10	2.0	199-04	MC7806C
7.7	8.3	1500	2.5	27	10.5	35	8.0	160	160	10	2.0	199-04	MC7808C
11.5	12.5	1500	2.5	23	14.5	35	8.0	240	240	10	2.0	199-04	MC7812C
14.4	15.6	1500	2.5	20	17.5	35	8.0	300	300	10	2.0	199-04	MC7815C
17.3	18.7	1000	3.0	17	21	35	8.0	360	360	10	2.0	199-04	MC7818C
23	35	1000	3.0	16	27	40	8.0	480	480	10	2.0	199-04	MC7824C



NEGATIVE VOLTAGE REGULATORS

V <sub>O</sub> (Vdc)		I <sub>O</sub> (mA dc max)	V <sub>in</sub> -V <sub>O</sub>   (Vdc)		V <sub>in</sub> (Vdc)		I <sub>IB</sub> (mA dc max)	Reg <sub>in</sub> %V <sub>O</sub> /V <sub>in</sub> (max)	Reg <sub>L</sub> (%V <sub>O</sub> max)	P <sub>D</sub> (W max)		Case	Type
min	max		min	max	min	max				T <sub>C</sub> = 25°C	T <sub>A</sub> = +25°C		
-55 to +125°C Temperature Range													
-3.6	37	200	-2.7	35	-8.5	-40	11	0.015	0.13	1.8	0.68	602A	MC1563*
		500							0.05	9.0	2.4	614	
-0.015	-40	20	2.0	50	-8.0	-50	5.0	0.1	0.05	1.8	0.68	603-02	MLM104
-25 to +85°C													
-0.015	-40	20	2.0	50	-8.0	-50	5.0	0.1	0.05	1.8	0.68	603-02	MLM204
0 to +70°C Temperature Range													
-3.8	-32	200	-3.0	40	-9.0	-35	14	0.030	0.13	1.8	0.68	602A	MC1463*
		500							0.05	9.0	2.4	614	
-0.035	-30	20	2.0	40	-8.0	-40	5.0	0.1	0.05	1.8	0.68	603-02	MLM304

\*Also available as nonencapsulated chip, use MCC prefix.

DUAL VOLTAGE REGULATORS

V <sub>OR</sub> <sup>†</sup> (Vdc)		I <sub>O</sub> (mA dc max)	V <sub>in</sub> -V <sub>O</sub>   (Vdc)		V <sub>in</sub> (Vdc)		I <sub>IB</sub> (mA dc max)	Reg <sub>in</sub> %V <sub>O</sub> /V <sub>in</sub> (max)	Reg <sub>L</sub> (%V <sub>O</sub> max)	P <sub>D</sub> (W max)		Case	Type	
min	max		min	max	min	max				T <sub>C</sub> = 25°C	T <sub>A</sub> = 25°C			
-55 to +125°C Temperature Range														
±14.8	±15.2	100	2.0	±17.2	±30	+4.0,-3.0	0.006	0.07	2.1 2.5 9.0	0.8 1.0 2.4	603-03 632 614	MC1568		
0 to +75°C Temperature Range														
±14.5	±15.5	100	2.0	±17.5	±30	+4.0,-3.0	0.01	0.07	2.1 2.5 9.0	0.8 1.0 2.4	603-03 632 614		MC1468	

†Preset Voltage Range: range is adjustable by adding external resistors from ±8.0 to ±20 Vdc.

SPECIAL-PURPOSE REGULATORS

V <sub>O</sub>		Reg <sub>in</sub> (max)	Reg <sub>L</sub> (max)	Current Regulation	P <sub>D</sub> (W max)	Case	Type	Features
min	max							
-55 to +125° C Temperature Range								
0	1000*	0.01%+1mV	0.01%+1mV	0.1% +1mA	0.300	632	MC1566	A floating regulator, can be used as a voltage controlled current source.
0 to +75° C Temperature Range								
0	1000*	0.03%+3mV	0.03%+3mV	0.02% +1mA	0.360	632	MC1466	A floating regulator, can be used as a voltage controlled current source.

\*Limited only by the characteristics of the external series pass transistor.



## SPECIAL-PURPOSE CIRCUITS

The linear-integrated-circuits listed in this section were developed by Motorola for the system design engineer to fill special-purpose requirements as indicated

by the subheadings. Temperature ranges and package availability are also tailored to provide versatility.

### MULTIPLIERS

Function	Linearity Error (typ)	Input Voltage Range (Vdc min)	Case	Type	
				-55 to +125°C	0 to +70°C
A four-quadrant multiplier designed to operate with $\pm 15$ -volt supplies; has internal level-shift circuitry and voltage regulator.	$\pm 0.3\%$	$\pm 10$	620	MC1594	—
	$\pm 0.5\%$	$\pm 10$	620	—	MC1494
Applications include multiply, divide, square root, mean square, phase detector, frequency doubler, balanced modulator/demodulator, electronic gain control.	X Input = 0.5% Y Input = 1.0%	$\pm 10$	632	MC1595*	—
	X Input = 1.0% Y Input = 2.0%	$\pm 10$	632	—	MC1495*

\*Also available as a nonencapsulated chip, use MCC prefix.

### BALANCED MODULATOR/DEMODULATOR

Function	Carrier Suppression dB @ f (MHz) (typ)		Common-Mode Rejection (dB typ)	Case	Type	
					-55 to +125°C	0 to +75°C
Balanced modulator/demodulator designed for use where the output voltage is a product of an input voltage (signal) and a switching function (carrier).	65 50	0.5 10	85	602A, 632	MC1596	MC1496

### LOW-FREQUENCY CIRCUITS

Function	Output Power (W typ)	Voltage Gain — typ (V/V typ)	Total Harmonic Distortion (% typ)	Case	Type	
					-55 to +125°C	0 to +70°C
A power amplifier device capable of single or split supply operation.	1.0	10, 18, 36	0.4	602B	MC1554	MC1454

### POWER-CONTROL CIRCUITS

Function	Temperature	Case	Type
Zero voltage switch for use in ac power switching with output capable of triggering triacs.	-10 to +75°C	644A	MFC8070

### TIMING CIRCUIT

Function	Supply Voltage VCC (Vdc — max)	Initial Timing Error VCC = 5 & 15 V, C = 0.1 $\mu$ F (%-typ)	VOL VCC = 15 V Isink = 50 mA (Vdc — max)	VOH VCC = 15 V Isource = 100 mA (Vdc — min)	Case	Type	
						-55 to +125°C	0 to +75°C
Wide range adjustable timers	16	1.0	0.75	12.75	601, 626	—	MC1455
	18	0.5	0.5	13	601	MC1555	—



## CONSUMER APPLICATION SELECTOR GUIDE

...reflecting Motorola's continuing commitment to semiconductor products necessary for consumer system designs. The tabulation contains data for a large number of components designed principally for entertainment

product applications. It is arranged to simplify first-order of linear integrated circuit device lineups to satisfy primary functions for Television, Audio, Radio, Automotive and Organ applications.

### TELEVISION CIRCUITS

#### SOUND

Function	Features	Case	Type
Sound IF, Detector, Limiter, Audio Preamplifier	80 $\mu$ V, 3 dB Limiting Sensitivity, 3.5 V(RMS) Output, Sufficient for Single Transistor Output Stage	646,647	MC1351
Sound IF Detector	Interchangeable with ULN2111A	646,647	MC1357
Sound IF Detector, DC Volume Control, Preamplifier	Excellent AMR, Interchangeable with CA3065	646,647	MC1358

#### VIDEO

1st and 2nd Video IF Amplifier	IF Gain @ 45 MHz — 60 dB typ AGC Range — 70 dB min	626	MC1349
	IF Gain @ 45 MHz — 46 dB typ, AGC Range — 60 dB min	626	MC1350
1st and 2nd Video IF, AGC Keyer and Amplifier	IF Gain @ 45 MHz — 53 dB typ, AGC Range — 65 dB min, "Forward AGC" Provided for Tuner	646,647	MC1352
	Same as MC1352, with Opposite AGC for Tuner	646	MC1353
3rd IF and Video Detector	Low-Level Detection, Low Harmonic Generation, Reduced Circuit Cost and Complexity, Reduced Shielding	626	MC1330
AGC Keyer, AGC Amplifier, Noise Gate, Sync Separator	High-Quality Noise Gate, One IF AGC Output and Two Tuner AGC Outputs, Adjustable AGC Delay	646	MC1345
Automatic Fine Tuning	High Gain AFT System, Interchangeable with CA3064	646 686	MC1364

#### CHROMA

Chroma IF Amplifier and Subcarrier System	Includes Complete Chroma IF, AGC, dc Gain and Tint Controls, Injection Locked Oscillator, Low Peripheral Parts Count	646	MC1398
Chroma Subcarrier System	Interchangeable with CA3070, APC Chroma Reference System	648	MC1370
Chroma IF Amplifier	Interchangeable with CA3071, Automatic and Manual Gain Control	646	MC1371
Chroma Demodulators	Similar to MC1328 but with Luminance and Blanking Inputs, Internal Matrix Provides RGB Outputs	646,647	MC1326
	Industry Standard Demodulator, Low Differential Output dc Drift	603-02 646,647	MC1328
Dual Chroma Demodulator	Dual Doubly Balanced Demodulator with RGB Output Matrix and PAL Switch	646,647	MC1327

#### DEFLECTION

Horizontal Processor	Includes Phase-Detector, Oscillator and Predriver; Linear Balanced Phase Detector; Adjustable dc Loop Gain	626	MC1391
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# AUDIO CIRCUITS

## PREAMPLIFIERS

Function	V <sub>CC</sub> (Vdc - max)	A <sub>vol</sub> (dB min)	THD (% typ)	Z <sub>o</sub> (Ohms typ)	Case	Type
Dual Preamplifier	±15	80	0.1	100	632	MC1303
Dual Low-Noise Preamplifier	16	63	0.1	100	646	MC1339
Low-Noise Preamplifier	33	80	0.1	100	644A	MFC8040

## DRIVERS

Function	V <sub>CC</sub> (Vdc)	Drive Current (mA)	A <sub>vol</sub> (dB)	Case	Type
Class A Audio Driver	18	30 min	42 min	206A	MFC4050
Class B Audio Drivers	35	150 peak	89 typ	644A	MFC8020A
	20	150 peak	87 typ	644A	MFC8021A
	45	150 peak	90 typ	644A	MFC8022A

## POWER AMPLIFIERS

Function	P <sub>O</sub> (Watts)	V <sub>CC</sub> (Vdc max)	e <sub>in</sub> @ rated P <sub>O</sub> (mV - max)	P <sub>D</sub> (mA - max)	R <sub>L</sub> (Ohms)	Case	Type
Audio Power Amplifiers	0.5	12	3.0	4.0	8.0	626	MC1306
	0.25	12	3.0	3.5	16	206A	MFC4000B
	1.0	20	100	5.0	16	643A	MFC6070
	1.0	22	10	10	8.0	644A	MFC8010
	2.0	24	200	12	16	641	MFC9020

# RADIO CIRCUITS

## IF AMPLIFIERS

Function	Gain @ 10.7 MHz (dB - typ)	3 dB Limiting @ 10.7 MHz (mV(RMS) typ)	AMR (dB - typ)	Recovered Audio Output Δf = 75 kHz (mV(RMS))	Power Supply (Volts - max)	Case	Type
IF Amplifier	58	—	—	—	18	626	MC1350
Limiting FM-IF Amplifier	—	0.175	60	690	18	646,647	MC1355
Limiting IF Amp/Quadrature Detector	53	0.600	45	480	16	646,647	MC1357
IF Amplifier	42	0.4	—	—	18	206A	MFC4010A
IF Amplifier, Nonsaturating Limiter	40	60	50	500	20	643A	MFC6010

## DECODERS

Function	Channel Separation (dB - typ)	THD (% - typ)	Stereo - Indicator Lamp Driver (mA - max)	Features	Case	Type
FM Multiplex Stereo Decoders	45	0.5	40	Audio Muting	646	MC1304
	45	0.5	40	Audio Muting	646	MC1305
	40	0.5	40	—	646/647	MC1307
	40	0.3	75	Coilless Operation	646	MC1310
Four-Channel SQ* Decoders	45	0.1	—	V <sub>CC</sub> = 20 Vdc nom	646	MC1312
	45	0.25	—	V <sub>CC</sub> = 12 Vdc nom	646	MC1313

\*Trademark of Columbia Broadcasting Systems Inc.

# AUTOMOTIVE CIRCUITS

## OPERATIONAL AMPLIFIER

Function	V <sub>CC</sub> Range (Vdc)	A <sub>vol</sub> (V/mV - typ)	I <sub>IB</sub> (μA - max)	Unity Gain Bandwidth (MHz - typ)	R <sub>in</sub> (MegΩ typ)	Case	Type
Quad Operational Amplifier	4.0 to 28	2.0	0.3	4.0	1.0	646	MC3301

## COMPARATOR

Function	V <sub>CC</sub> Range (Vdc)	V <sub>IDR</sub> (Vdc)	I <sub>IB</sub> (μA - max)	Output Leakage Current (μA - max)	Sink Current	Case	Type
Quad Comparator	2.0 to 28	±V <sub>CC</sub>	0.5	1.0	6.0	646	MC3302



ORGAN CIRCUITS

FREQUENCY DIVIDERS

Function	VCC Range (Vdc)	fTog (MHz – typ)	VOH (Vdc – min)	Case	Type
Toggle Flip-Flop	4.0 to 16	1.0	15.5	206A	MFC4040
Dual Toggle Flip-Flop	4.0 to 16	1.0	15.5	643A	MFC6020

RHYTHM

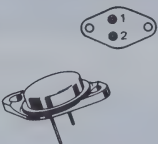

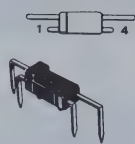





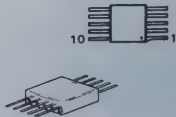
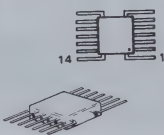
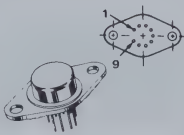
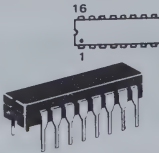
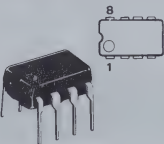
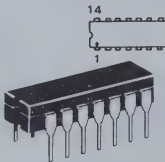
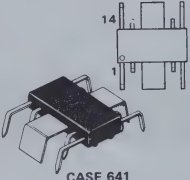
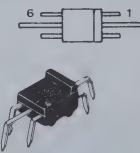
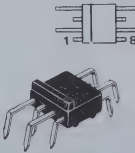
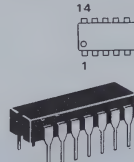
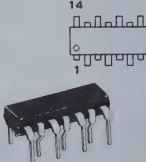
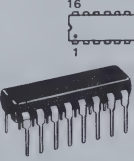
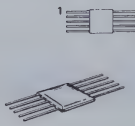
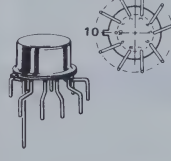
Dual Toggle Flip-Flop with Reset	4.0 to 16	1.0	15.5	643A	MFC6050
3-Input AND Gate	4.0 to 16	–	15	643A	MFC6060
R-S Flip-Flop	4.0 to 16	1.0	15.5	643A	MFC6080
J-K Flip-Flop	4.0 to 16	1.0	15.5	644A	MFC8050

ATTENUATOR

Function	VCC Range (Vdc)	THD (% – typ)	Av (dB – typ)	Attenuation Range (dB – typ)	Case	Type
Electronic Attenuator	9.0 to 18	0.6	13	90	643A	MFC6040



# LINEAR IC PACKAGES

 <p><b>CASE 11 (TO-3)</b> No Suffix</p>	 <p>Pin 1 Input Pin 2 Output Pin 3 Ground</p> <p><b>CASE 199-04</b> Suffix P after type number</p>	 <p><b>CASE 206A</b> No Suffix</p>	 <p><b>CASE 601 (TO-99)</b> Suffix G after type number</p>	
 <p><b>CASE 602A</b> Suffix G after type number</p>	 <p><b>CASE 602B</b> Suffix G after type number</p>	 <p><b>CASE 603-02 (TO-100)</b> Suffix G after type number</p>	 <p><b>CASE 603-03</b> Suffix G after type number</p>	 <p><b>CASE 606 (TO-91)</b> Suffix F after type number</p>
	 <p><b>CASE 607 (TO-86)</b> Suffix F after type number</p>	 <p><b>CASE 614</b> Suffix R after type number</p>	 <p><b>CASE 620</b> Suffix L after type number</p>	
	 <p><b>CASE 626</b> Suffix P after type number</p>	 <p><b>CASE 632 (TO-116)</b> Suffix L after type number</p>	 <p><b>CASE 641</b> No Suffix</p>	
 <p><b>CASE 643A</b> No Suffix</p>	 <p><b>CASE 644A</b> No Suffix</p>	 <p><b>CASE 646 (TO-116)</b> Suffix P after type number</p>	 <p><b>CASE 647</b> Suffix PQ after type number</p>	
 <p><b>CASE 648</b> Suffix P after type number</p>	 <p><b>CASE 665</b> Suffix F after type number</p>	 <p><b>CASE 686</b> Suffix G after type number</p>		



# PACKAGING and HARDWARE

## PACKAGING

Lead Tape Packaging Standards for Axial-Lead Components	Page 7-2
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## HARDWARE

MH745 MH746	Rectifier — zener diode mounting hardware	Page 7-4
MK10 MK15 MK20 MK25 MK30 MK35	Power transistor mounting hardware	Page 7-5
MS-10 MS-15	Power transistor heat sink	Page 7-11



# LEAD TAPE PACKAGING STANDARDS FOR AXIAL-LEAD COMPONENTS

## 1.0 SCOPE

This document covers packaging requirements for the following axial-lead components for use in automatic testing and assembly equipment: Motorola Case 51 (DO-7), Case 52 (DO-13), Case 59 (DO-41), Case 267, and Case 17. Packaging, as covered in this document, shall consist of axial-lead components mounted by their leads on pressure-sensitive tape, either wound onto a reel or folded in an oriented manner in a container (ammunition pack).

## 2.0 PURPOSE

This document establishes Motorola standard practices for lead-tape packaging of axial-lead components and meets the requirements of EIA Standard RS-296-B, "Reel Packaging of Components with Axial Leads."

## 3.0 REQUIREMENTS

### 3.1 Component Leads

3.1.1 Component leads shall not be bent beyond 0.047 inch from their nominal position. See Figure 2.

3.1.2 The "C" dimension shall be governed by the overall length of the reel packaged component. The distance between flanges shall be 0.125 inch to 0.250 inch greater than the overall component length. See Figures 2 and 3.

### 3.2 Orientation

All polarized components must be oriented in one direction. The cathode lead tape shall be blue, and the anode tape shall be white. See Figure 1.

### 3.3 Reeling

3.3.1 Components on any reel shall not represent more than two date codes when date code identification is required.

3.3.2 Component leads shall be positioned perpendicularly between pairs of 0.250 inch tape. See Figure 2.

3.3.3 A minimum 12 inch leader of tape shall be provided before the first and last component on the reel.

3.3.4 50 lb. Kraft paper must be wound between layers of components as far as necessary for component protection. Width of paper

is 0.062 inch to 0.750 inch less than "C" dimension of reel. See Figure 3.

3.3.5 A row of components must be centered between the tapes  $\pm 0.047$  inch. In addition, individual components may deviate from center of component row  $\pm 0.031$  inch. See Figure 2.

3.3.6 Staples shall not be used for splicing. No more than 4 layers of tape shall be used in any splice area and no tape shall be offset from another by more than 0.031 inch noncumulative. Tape splices shall overlap at least 6 inches for butt joints and at least 3 inches for lap joints, and shall not be weaker than unspliced tape.

3.3.7 Quantity per reel shall be as indicated in Table 1. When reeling quantity is less than the established minimum of a suitable sized reel, an ammunition pack will be used. Quantities less than the ammunition pack minimum will not be lead-taped.

3.3.8 A maximum of 10 components may be missing from any 10 foot section. A maximum of 2 consecutive components may be missing, provided this gap is followed by 6 consecutive components.

3.3.9 The single face roll pad shall be placed around the finished reel and taped securely. Each reel shall then be placed in an appropriate container.

### 3.4 Marking

Minimum reel and carton marking shall consist of the following: See Figure 3.

Customer Part Number  
Purchase Order Number  
Quantity  
Date of Reeling (when applicable)  
Manufacturer's Name  
Electrical Value (when applicable)  
Date Codes (when applicable; see Note 3.3.1)  
Tape (when applicable)

## 4.0 EXCEPTIONS

Requirements differing from this Motorola standard shall be negotiated with the factory.



LEAD TAPE PACKAGING STANDARDS FOR  
AXIAL-LEAD COMPONENTS (continued)

TABLE 1 – PACKAGING

Component Type (Case)	Quantity Per Reel Min/Max	Ammunition Pack Qty. Min	Component Spacing A	Tape Spacing B	Reel Dimensions	
					C	D
Case 51 (DO-7) Case 59 (DO-41)	1000/3000	500	$0.200 \pm 0.015$	$2.00 \pm 0.010$	3.00	10.50
Case 17	1000/2000	500	$0.200 \pm 0.015$	$2.00 \pm 0.010$	3.00	10.50
Case 52 (DO-13)	500/1500	250	$0.375 \pm 0.015$	$2.375 \pm 0.020$	3.81	14.00
Case 267	500/900	250	$0.375 \pm 0.015$	$2.00 \pm 0.010$	3.00	10.50

FIGURE 1 – REEL PACKING

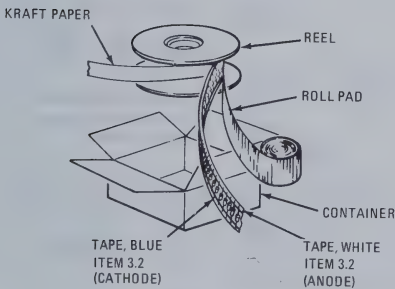


FIGURE 2 – COMPONENT SPACING

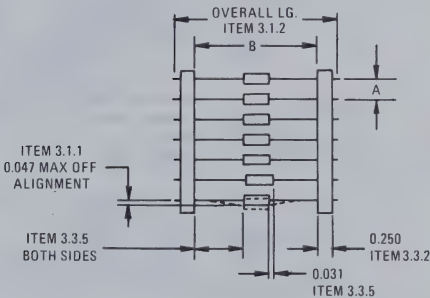


FIGURE 3 – REEL DIMENSIONS

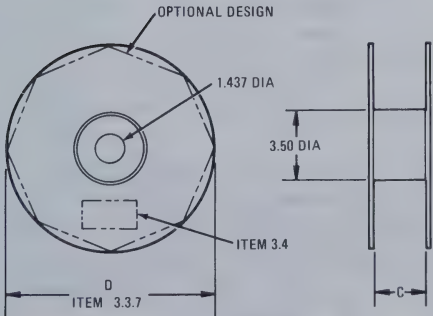
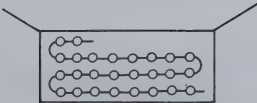


FIGURE 4 – AMMUNITION PACK



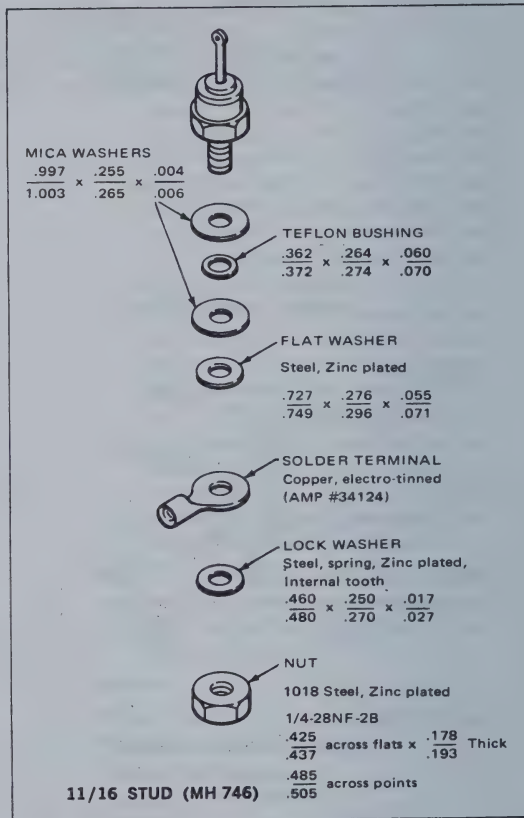
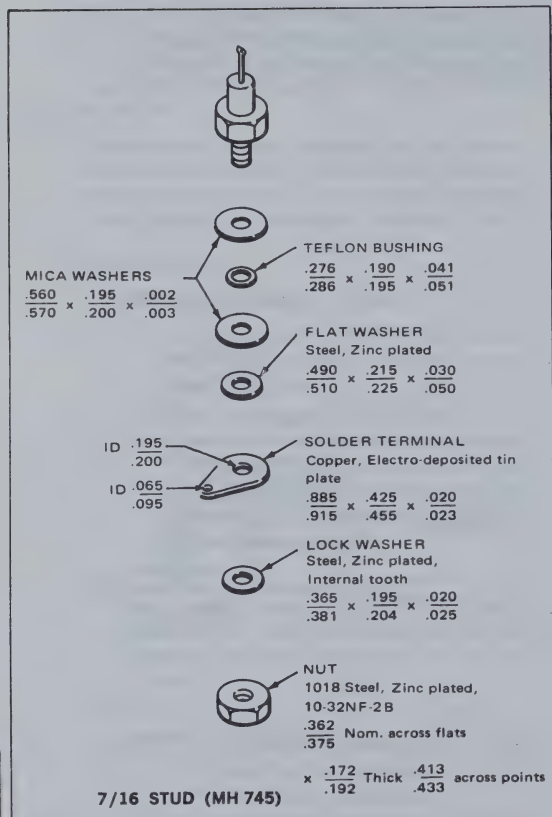


# MH745 MH746

## MOUNTING HARDWARE for MOTOROLA STUD PACKAGES

$\frac{7}{16}$ " RECTIFIER and 10 WATT ZENER DIODE

$\frac{11}{16}$ " RECTIFIER and 50 WATT ZENER DIODE

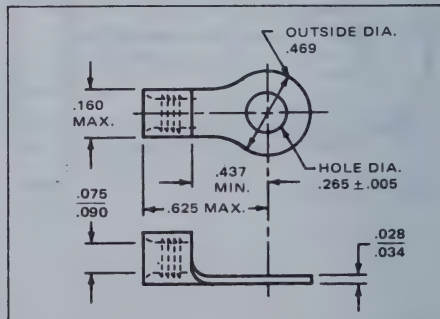


Finish meets all environmental requirements of MIL-STD-19500.

Mounting hardware is supplied with the units. For additional hardware, order by kit number:

**MH745 —  $\frac{7}{16}$ " STUD MOUNTING HARDWARE**

**MH746 —  $\frac{11}{16}$ " STUD MOUNTING HARDWARE**





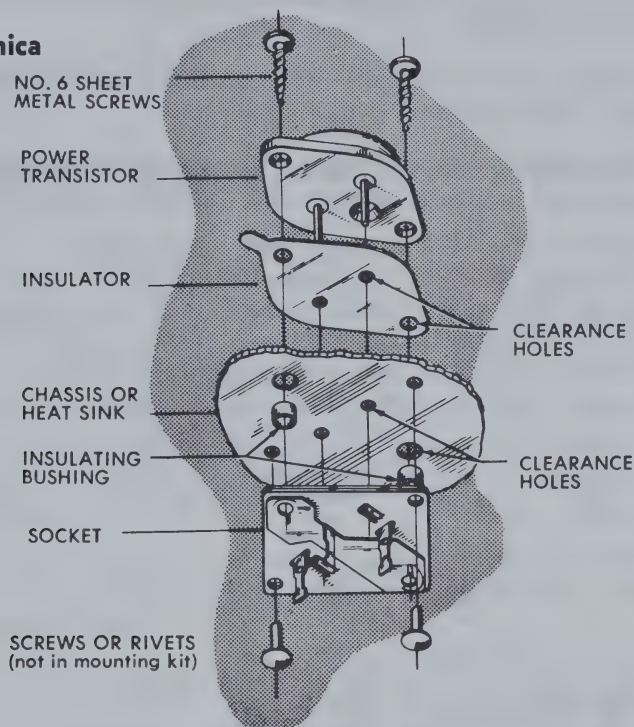
## POWER TRANSISTOR MOUNTING KITS

**MK-10** — teflon

**MK-15** — mica

**MK-20** — anodized aluminum

**MK-25** — mica



Typical thermal characteristics for teflon, mica, and anodized aluminum insulators used in mounting kits are given in the table below. (Figures may vary with mounting torque applied. Do not over stress.)

KIT TYPE	INSULATING WASHER	TYPICAL THERMAL RESISTANCE ( $^{\circ}\text{C}/\text{Watt}$ )	
		Dry	With DC4*
—	No Insulator	.20	.10
MK-10	Teflon	1.45	.80
MK-15	Mica	.80	.40
MK-20	Anodized Aluminum	.40	.35
MK-25	Mica	.80	.40

\*DC4 is Dow Corning No. 4 Silicone Lubricant.

Mounting kits, types MK-10, MK-15, MK-20, and MK-25 provide the necessary hardware for correctly mounting all TO-3 and TO-66 industry standard power transistor types to a chassis. With these kits, power transistors can be electrically insulated from the heat sink chassis, while maintaining complete heat transfer characteristics.

Included in these highly useful kits are a transistor mounting socket, front and back mounting templates for hole drilling guides, two #6 mounting screws, two insulating bushings, an insulating washer and complete mounting instructions.

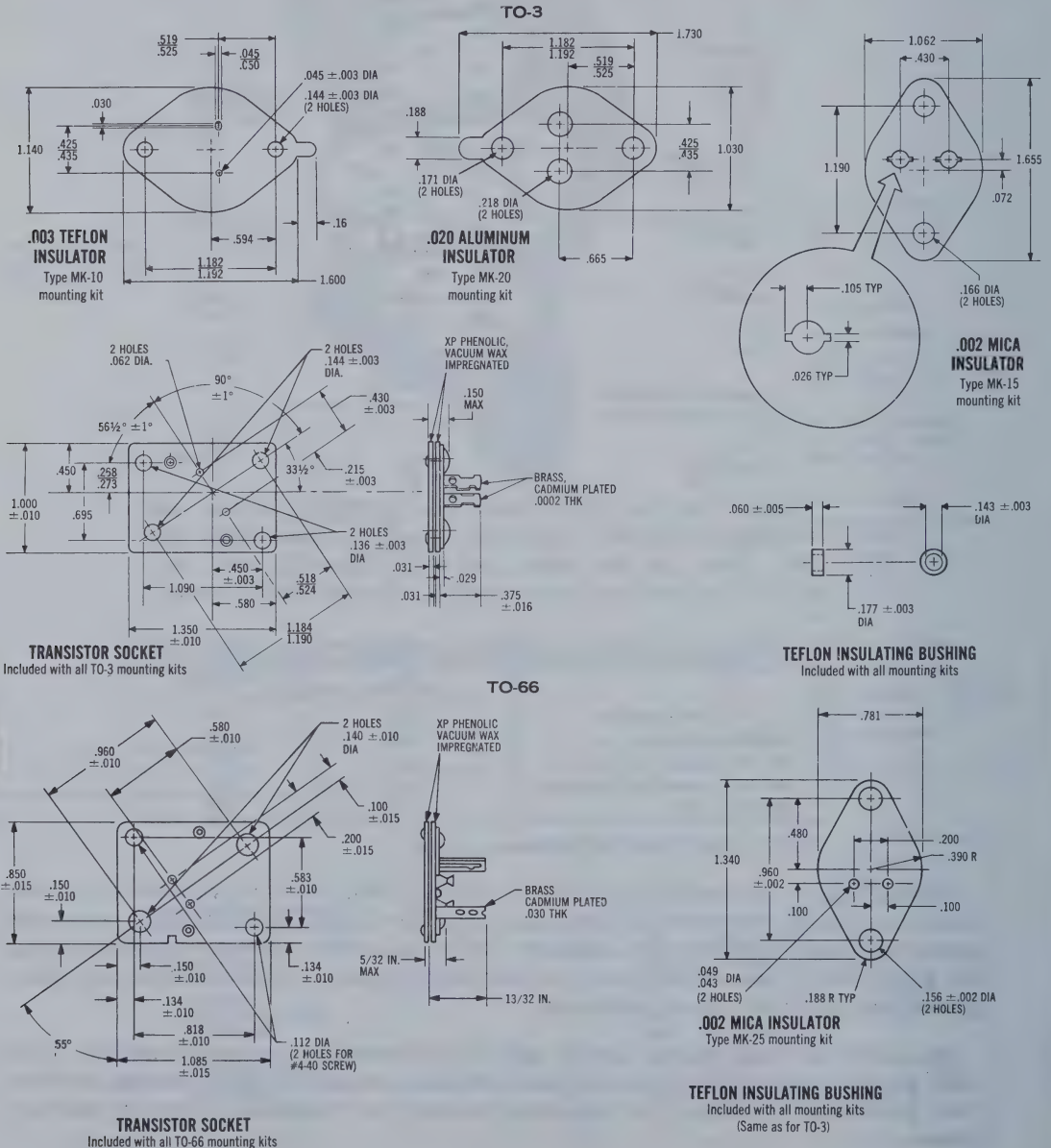


## MK-10, MK-15, MK-20, MK-25 (continued)

The teflon-coated glass cloth insulating washer, included in kit MK-10, will find use in installations requiring an insulator of excellent durability. The mica insulator, in kit MK-15 and MK-25, is characterized by very high thermal conductivity. In applications where both good thermal conduction and durability are necessary, the anodized aluminum insulator supplied in kit MK-20, is recommended.

The transistor socket included in all mounting kits, is made of rugged laminated phenolic, with contacts of phosphor bronze.

Three cadmium plated solder lugs, having a 15-amp maximum current capacity, are provided for base, emitter and collector connections.





**MK-30**

**MK-35**

## **POWER TRANSISTOR MOUNTING KITS**

Mounting kits, types MK-30 and MK-35, provide the necessary hardware to properly mount the TO-36 case (standard industry-type power transistors) to the chassis. With these kits, power transistors can be electrically insulated from the heat sink chassis, while maintaining complete heat transfer characteristics.

**MK-30** Designed for use in applications requiring 30 Amps or less with solder connection to the transistor leads.

**MK-35** Designed for use in applications requiring greater than 30 Amps with solderless connection to the transistor leads.

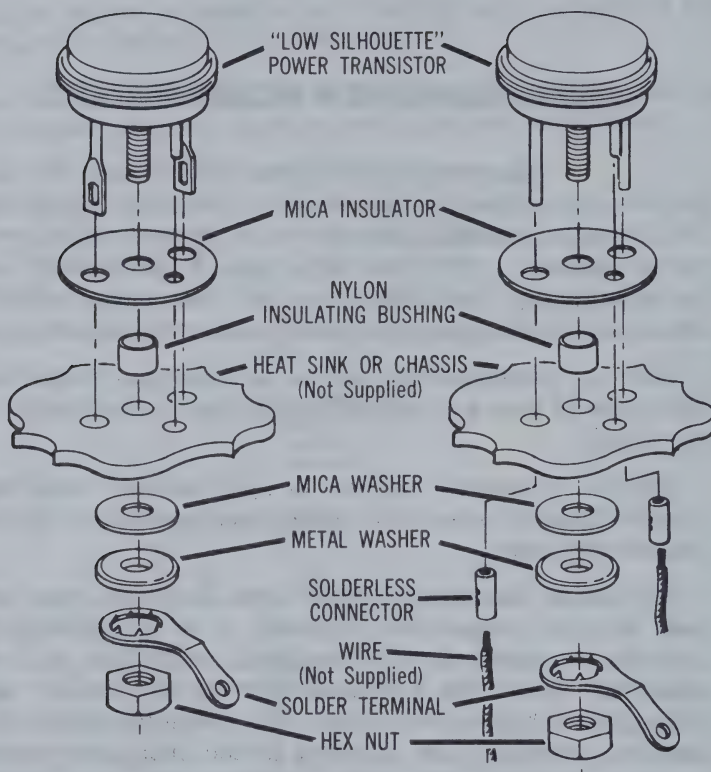
To obtain maximum contact area between case and heat sink for better heat transfer, it is recommended that the transistor first be mounted on the heat sink or chassis. Then, for maximum wire-to-transistor lead strength and high-current capacity, the solderless connectors provided are crimped to the transistor leads and heavy wire. The wires may be soldered directly to the leads if strength and high currents (approximately 50 Amps) are not the primary considerations. (Solderless connector tools are available from the Thomas and Betts Co., Elizabeth, N. J. Possible wire types: AWG #12 regular strand (65 x 30) or #10 solid-tinned copper wire.)

These new mounting kits are individually packaged in a convenient polyethylene container.



**MK-30**  
15 AND 30  
AMP UNITS

**MK-35**  
60 AMP UNITS



**NOTE:** The surface to which the transistor is mounted must be smooth, flat and free of burrs or irregularities which may damage insulation or prevent intimate contact with the transistor mounting base.

Typical thermal characteristics for mica insulators are given in the table below. (Figures may vary with mounting torque applied. Do not over stress.)

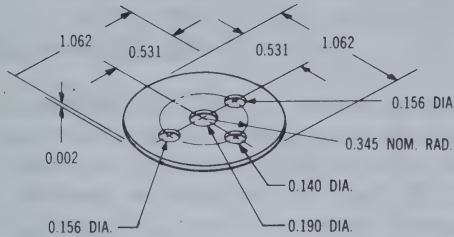
KIT TYPE	INSULATING WASHER	MAXIMUM THERMAL RESISTANCE (*C/Watt)	
		Dry	With DC4*
—	No Insulator	.20	.10
MK-30	Mica	.80	.40
MK-35	Mica	.80	.40

\*DC4 is Dow Corning No. 4 Silicone Lubricant.

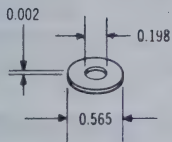


## OUTLINE DIMENSIONS

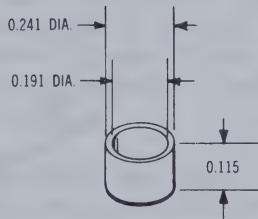
### MK-30 / MK-35



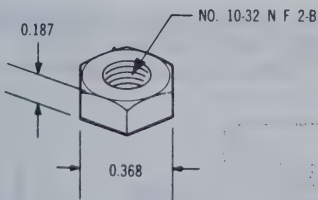
**MICA INSULATOR**  
14B52600F06



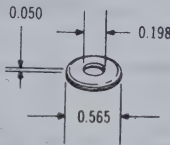
**MICA WASHER**  
14B52600F01



**NYLON INSULATING BUSHING**  
43B51547F01



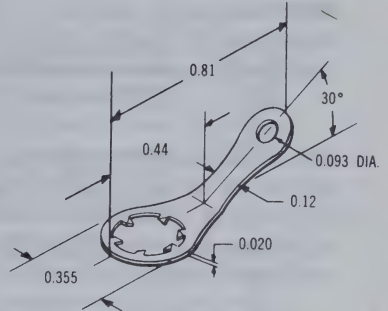
**HEX NUT**  
(Cadmium Plated)  
02B51568F13



**METAL WASHER**  
(Cadmium Plated)  
04B51567F17

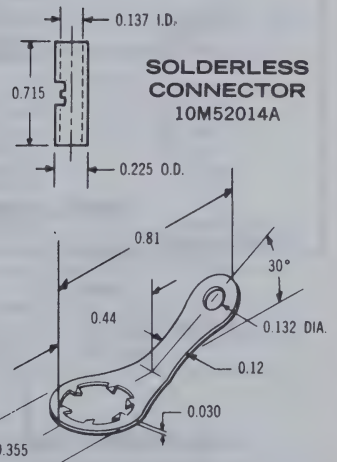
NOTE: All Dimensions Nominal

### MK-30 ONLY



**SOLDER TERMINAL**  
(Tin Dipped)  
29B52595F13

### MK-35 ONLY



**SOLDER TERMINAL**  
(Cadmium Plated)  
29B52595F09



# MOUNTING HARDWARE for MOTOROLA Case 221

DIMENSIONS - MILLIMETER (INCH)

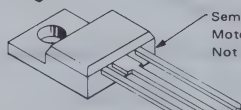
## MK221-1



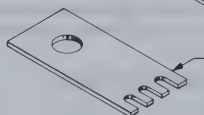
Screw-6-40 x 0.62 Long  
Carbon Steel, Cadmium Plated  
 $\left( \frac{0.250}{0.244} \right)$  Across Flats x  $\left( \frac{0.093}{0.080} \right)$  Thick  
(0.272) Across Points



Rectangular Washer  
Steel, Ni Plated  
 $\frac{1.62}{1.52} \left( \frac{0.064}{0.060} \right)$  Thick x  $\frac{5.72}{5.46} \left( \frac{0.225}{0.215} \right)$   
Wide, x  $\frac{10.41}{10.16} \frac{0.410}{0.400}$  Long



Semiconductor  
Motorola Case No. 221  
Not Furnished With Kit



Mica Insulator  
 $\frac{0.07}{0.05} \left( \frac{0.003}{0.002} \right)$  Thick x 13.97  
(0.550) Wide x 21.3 (0.84)  
Long



Nylon Bushing  
See detail  
below.



Nut  
Carbon Steel, Cadmium Plated  
#6-40 Thread  
 $\left( \frac{0.312}{0.302} \right)$  Across Flats X  
 $\left( \frac{0.114}{0.102} \right)$  Thick  
 $\left( \frac{0.361}{0.344} \right)$  Across Points

MTG KIT MK221-1  
(20CSB09456A001)

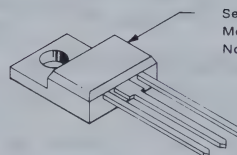
## MK221-2

Rectangular Washer  
Steel, Ni Plated

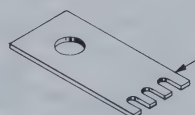
$\frac{1.62}{1.52} \left( \frac{0.064}{0.060} \right)$  Thick x  $\frac{5.72}{5.46} \left( \frac{0.225}{0.215} \right)$



Wide, x  $\frac{10.41}{10.16} \left( \frac{0.410}{0.400} \right)$  Long



Semiconductor  
Motorola Case No. 221  
Not Furnished With Kit

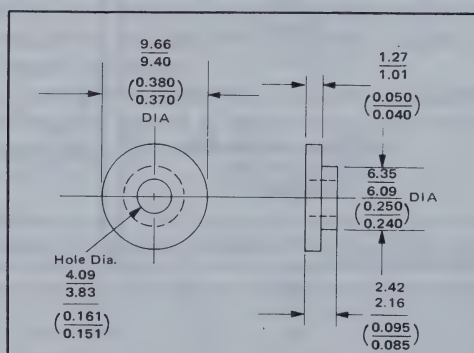


Mica Insulator  
 $\frac{0.07}{0.05} \left( \frac{0.003}{0.002} \right)$  Thick x 13.97  
(0.550) Wide x 21.3 (0.84)  
Long



Nylon Bushing  
See detail  
below.

MTG KIT MK221-2  
(20CSB09456A002)





# MS-10 POWER TRANSISTOR HEAT SINK

Designed specifically for use with the industry standard type TO-3 (diamond) power transistor, this heat sink will reduce transistor junction temperatures and permit safe operation at higher power levels or under high ambient temperatures.

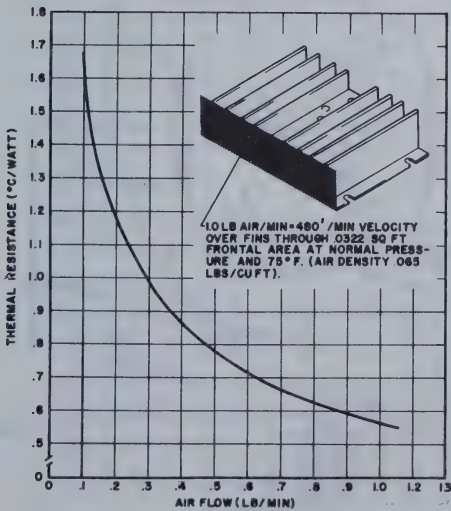
Cooling is accomplished with the MS-10 by conduction, convection and radiation. Although measuring only 4-1/2" by 3-1/16", the MS-10 makes possible thermal dissipation effectively equal to that of a flat sheet of aluminum 10" by 8" by 1/8". This greatly reduces the chassis area necessary for heat dissipation at higher power levels.

The transistor with use of silicon grease should be mounted directly to the MS-10 heat sink with the insulating washers placed at each of the (4) mounting points located on the heat sink flange. This is accomplished by placing (1) shoulder washer on the bottom and (1) flat washer on top of each mounting point of the heat sink. A mica washer is supplied to isolate the transistor from the heat sink if desired.

The MS-10 has a hole pattern arrangement which will accommodate the mounting of one TO-3 power transistor and/or two 10/32" stud mounting diodes. Provided with each MS-10 package is an MK-15 power transistor mounting kit which contains a power transistor socket, mounting screws, complete mounting instructions and a mica insulating washer for use in mounting transistors to the heat sink.

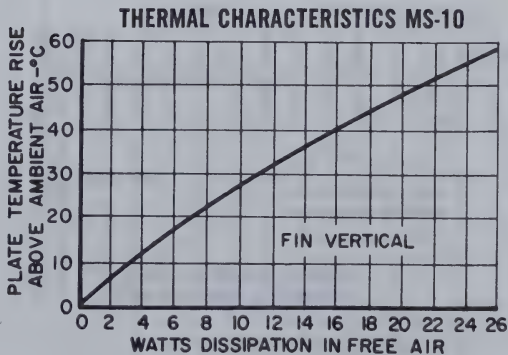
This heat sink is easy to install and does not interfere with the operation of the transistor. For optimum efficiency, the MS-10 should be mounted with the fins vertical.

PERFORMANCE UNDER FORCED AIR FLOW  
OF MS-10 NATURAL CONVECTION  
TRANSISTOR HEAT SINK



SPECIFICATIONS

Material	Aluminum Alloy
Finish	Black
Total Surface Area	65 Sq. In. (approx.)
Thermal Resistance	3°C/watt









# MS-15 POWER TRANSISTOR HEAT SINK

Designed specifically for use with the industry standard type TO-36 ("door-knob") power transistor, this heat sink will reduce transistor junction temperatures and permit safe operation at higher power levels or under high ambient temperatures.

Cooling is accomplished with the MS-15 by conduction, convection and radiation. Although measuring only 4-1/2" by 3-1/16", the MS-15 makes possible thermal dissipation effectively equal to that of a flat sheet of aluminum 10" by 8" by 1/8". This greatly reduces the chassis area necessary for heat dissipation at higher power levels.

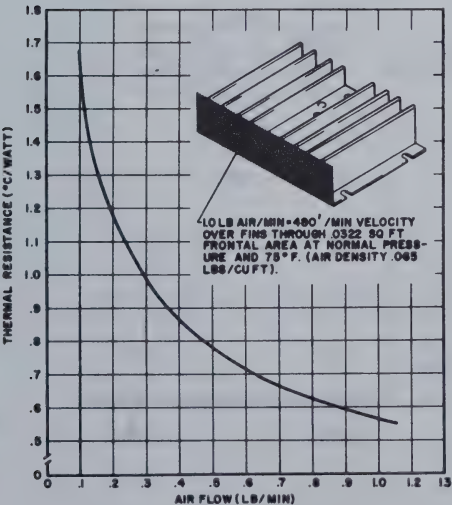
The MS-15 has a hole pattern arrangement which will accommodate the mounting of one TO-36 power transistor. Provided with each MS-15 package is assorted mounting hardware such as: insulating bushing, mica washer, nut, flat washer, solder terminal and insulating washers used in mounting the heat sink to the chassis.

The transistor with use of silicon grease should be mounted directly to the MS-15 heat sink with the insulating washers placed at each of the (4) mounting points located on the heat sink flange. This is accomplished by placing (1) shoulder washer on the bottom and (1) flat washer on top of each mounting point of the heat sink. A mica washer is supplied to isolate the transistor from the heat sink if desired.

NOTE: When mounting the transistor to the heat sink a torque of 20 in. lbs. max should be applied to the stud.

This heat sink is easy to install and does not interfere with the operation of the transistor. For optimum efficiency, the MS-15 should be mounted with the fins vertical.

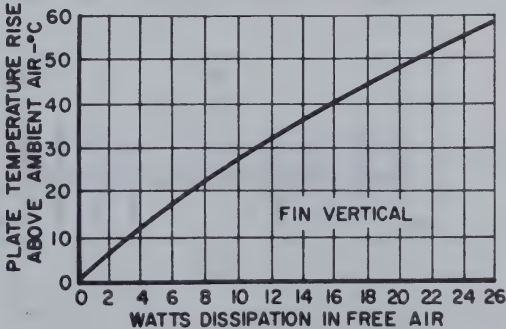
PERFORMANCE UNDER FORCED AIR FLOW  
OF MS-15 NATURAL CONVECTION  
TRANSISTOR HEAT SINK



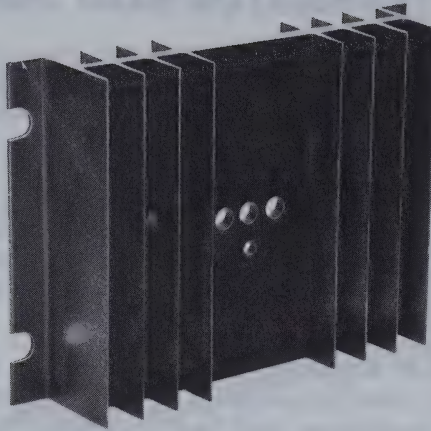
SPECIFICATIONS

Material	Aluminum Alloy
Finish	Black
Total Surface Area	65 Sq. In. (approx.)
Thermal Resistance	3°C/watt

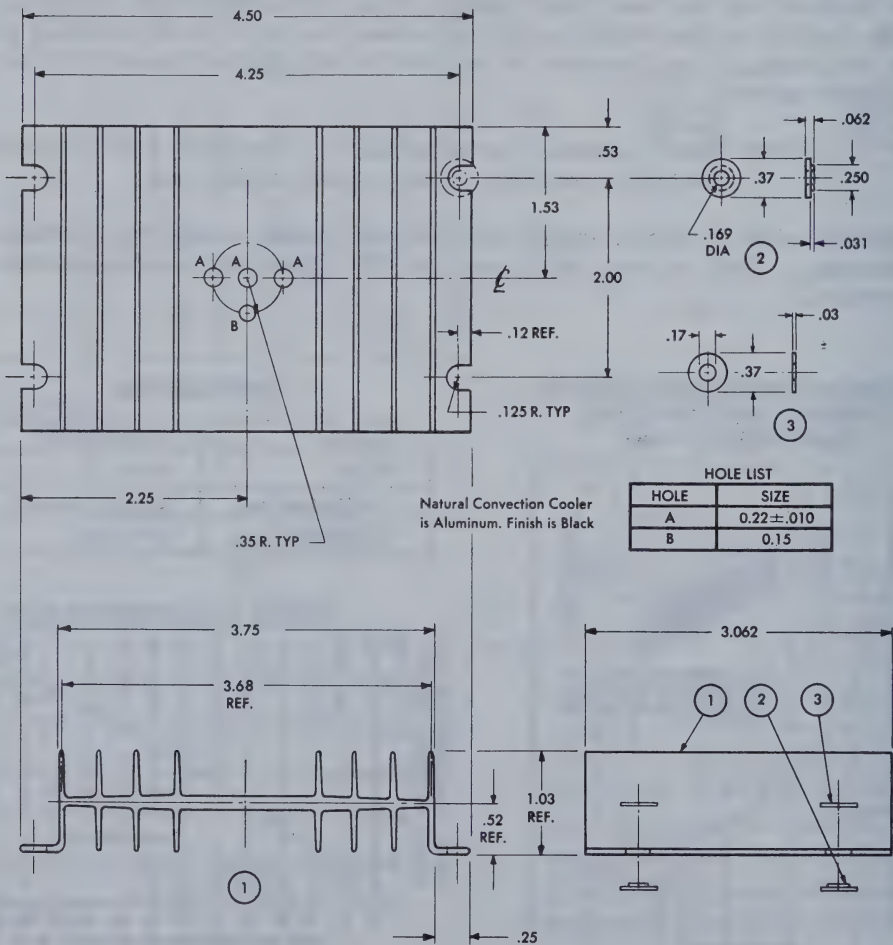
THERMAL CHARACTERISTICS MS-15







Providing cooling by conduction, convection and radiation, the MS-15 Heat Sink, measuring only 4-1/2" by 3-1/16", has thermal dissipation equal to that of a flat sheet of aluminum 10" x 8" x 1/8".





# OUTLINE DIMENSIONS

## INDEX

Motorola Case Number Cross Reference	Page 8-2
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Case 3-01	—	Case 52	DO-13	Case 116	—
Case 3-04	—	Case 53	—	Case 117	—
Case 4-04	—	Case 54	—	Case 119-01	—
Case 5-03	TO-36	Case 55	—	Case 126	—
Case 6	—	Case 56	DO-4	Case 127	—
Case 7-02	TO-68	Case 57	—	Case 128	—
Case 8	—	Case 58	—	Case 130	—
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Case 11	—	Case 60	—	Case 132	—
Case 11A	—	Case 61	—	Case 133	—
Case 12	TO-3*	Case 63	—	Case 134	—
Case 17	—	Case 64	TO-48	Case 135	—
Case 20	TO-72	Case 70	—	Case 136	—
Case 21	TO-17	Case 77-02	—	Case 137	—
Case 21-02	TO-17	Case 77-03	—	Case 138	—
Case 22	—	Case 79	TO-39	Case 139	—
Case 22-03	TO-18	Case 80-02	TO-66	Case 144B-03	—
Case 22A	—	Case 81A-01	—	Case 144C-02	—
Case 23	TO-107	Case 81A-02	—	Case 144D-04	—
Case 24	TO-102	Case 82	—	Case 145A-01	—
Case 26	TO-46	Case 85	—	Case 145A-02	—
Case 27	TO-52	Case 85L	—	Case 145C-01	—
Case 28	—	Case 86	—	Case 146	DO-14
Case 29-01	—	Case 86L	—	Case 149-02	TO-1
Case 29-02	TO-92	Case 87	—	Case 152-02	—
Case 29-03	TO-92	Case 87L	—	Case 154	—
Case 29A	—	Case 88	—	Case 154A	—
Case 31	TO-5	Case 88L	—	Case 155	—
Case 34A	TO-12	Case 90-04	—	Case 155A	—
Case 36	TO-60	Case 90-05	—	Case 156	—
Case 39	TO-37	Case 100	—	Case 156A	—
Case 41	—	Case 105	—	Case 157	—
Case 42A	DO-5	Case 106	—	Case 157A	—
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Case 45	—	Case 110	—	Case 160A	TO-59
Case 46	—	Case 111	—	Case 161	—
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Case 47A	—	Case 113	—	Case 167	—
Case 48	—	Case 114	—		

\*Modified



# MOTOROLA CASE NUMBER CROSS REFERENCE (continued)

Case 168	—	Case 245	—	Case 638	—
Case 171	—	Case 246	TO-83	Case 639	—
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Case 174-02	TO-203AA	Case 249-01	—	Case 643A	—
Case 175	—	Case 250	—	Case 644A	—
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Case 181-02	—	Case 267	—	Case 651	—
Case 182-03	—	Case 270-01	—	Case 654-04	TO-78
Case 183	—	Case 278-01	—	Case 654-07	—
Case 184	—	Case 279-01	—	Case 655	TO-71
Case 188	TO-63	Case 289-01	—	Case 662-01	—
Case 189	—	Case 290-01	—	Case 663	—
Case 190-01	—	Case 601	TO-99	Case 664-01	—
Case 194	—	Case 602A	—	Case 665	—
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Case 205	—	Case 605B-02	—	Case 677	—
Case 206A	—	Case 606	TO-91	Case 680-01	—
Case 208	—	Case 607	TO-86	Case 680-02	—
Case 209	—	Case 608	TO-90	Case 681	—
Case 210	—	Case 609	TO-85	Case 683	—
Case 211-01	—	Case 610A-03	TO-89	Case 684	—
Case 211-02	—	Case 614	—	Case 685	—
Case 212	—	Case 617	—	Case 686	—
Case 215	—	Case 618	—	Case 687	—
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Case 219	TO-94	Case 619-02	—	Case 690	—
Case 220	—	Case 620	—	Case 695	TO-71 *
Case 220-01	—	Case 621	—	Case 697	—
Case 221-02	TO-220AB	Case 623	—	Case 700-01	—
Case 226	—	Case 625	—		
Case 234-01	—	Case 526	—		
Case 234-02	—	Case 627	—		
Case 235	—	Case 628	TO-91		
Case 237-01	—	Case 631	—		
Case 238-01	—	Case 632	TO-116		
Case 239-01	—	Case 635	—		
Case 244	—	Case 637	—		



# REGISTERED CASE NUMBER CROSS REFERENCE

DO-4	Case 44	TO-60	Case 36
	Case 56	TO-61	Case 9
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	Case 257	TO-66	Case 80-02
DO-7	Case 51	TO-68	Case 7-02
DO-13	Case 52	TO-71	Case 655
DO-14	Case 146	TO-71*	Case 695
DO-21	Case 43-02	TO-72	Case 20
	Case 43-04	TO-76	Case 642
DO-31	Case 81-02	TO-78	Case 654-04
CO-41	Case 59	TO-83	Case 246
	Case 61	TO-85	Case 600
TO-1	Case 149-02	TO-86	Case 607
TO-3	Case 1-03	TO-89	Case 610A-03
	Case 12	TO-90	Case 608
TO-5	Case 31	TO-91	Case 606
TO-9	Case 143		Case 628
TO-12	Case 34A	TO-92	Case 29-02
TO-17	Case 21-02	TO-94	Case 219
TO-18	Case 22-03	TO-99	Case 601
TO-36	Case 5-03	TO-100	Case 603-02
TO-37	Case 39		Case 603-03
TO-39	Case 79	TO-102	Case 24
TO-41*	Case 161	TO-107	Case 23
TO-46	Case 26	TO-114	Case 177
TO-48	Case 64	TO-116	Case 632
TO-52	Case 27		Case 646-02
TO-59	Case 160-03	TO-203AA	Case 174-02
	Case 160A	TO-220AB	Case 221-02

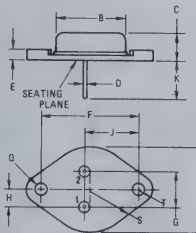
\*Modified



# CASE OUTLINE DIMENSIONS

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

## CASE 1 TO-3



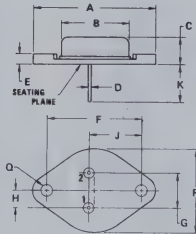
STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE-COLLECTOR

STYLE 2:  
PIN 1. BASE  
2. COLLECTOR  
CASE-EMITTER

DIM	MIN	MAX	MIN	MAX
B	-	22.23	-	0.875
C	6.35	11.43	0.250	0.450
D	0.97	1.29	0.038	0.043
E	-	3.43	-	0.135
F	29.90	30.40	1.177	1.197
G	10.67	11.18	0.420	0.440
H	5.21	5.72	0.205	0.225
J	16.64	17.15	0.655	0.675
K	7.92	-	0.312	-
L	3.84	4.09	0.151	0.161
M	-	13.94	-	0.525
N	-	4.78	-	0.188

All JEDEC dimensions and notes apply

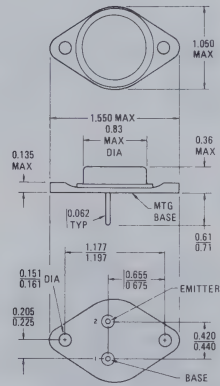
## CASE 3-01



STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE-COLLECTOR

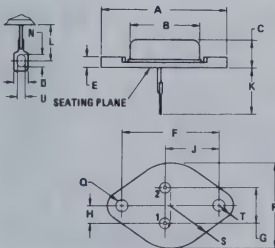
DIM	MIN	MAX	MIN	MAX
A	38.86	39.37	1.530	1.550
B	20.57	21.08	0.810	0.830
C	-	9.14	-	0.360
D	1.22	1.32	0.048	0.052
E	3.19	3.43	0.125	0.135
F	29.90	30.40	1.177	1.197
G	10.67	11.18	0.420	0.440
H	5.33	5.59	0.210	0.220
J	16.64	17.15	0.655	0.675
K	8.13	10.67	0.320	0.420
L	3.84	4.09	0.151	0.161
M	26.16	26.67	1.030	1.050

## CASE 3-04



Collector connected to case

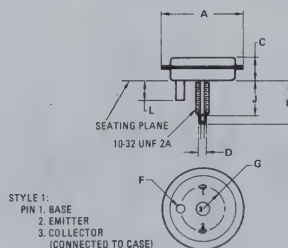
## CASE 4-04



DIM	MIN	MAX	MIN	MAX
A	-	35.37	-	1.550
B	-	21.08	-	0.830
C	-	7.62	-	0.300
D	4.32	4.83	0.170	0.190
E	-	3.43	-	0.135
F	29.90	30.40	1.177	1.197
G	10.67	11.18	0.420	0.440
H	5.33	5.59	0.210	0.220
J	16.64	17.15	0.655	0.675
K	-	17.27	-	0.680
L	3.30	4.32	0.130	0.170
M	3.84	4.09	0.151	0.161
N	-	26.67	-	1.050
O	2.03	3.05	0.080	0.120

STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE-COLLECTOR

## CASE 5-03 TO-36

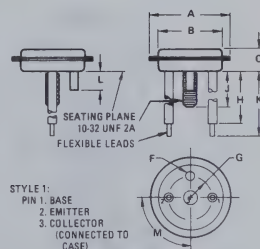


STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR  
(CONNECTED TO CASE)

DIM	MIN	MAX	MIN	MAX
A	-	31.75	-	1.250
B	-	13.21	-	0.520
C	-	4.83	-	0.190
D	-	3.56	-	0.140
E	8.76 NOM	-	0.345 NOM	-
F	9.53	12.70	0.375	0.500
G	15.48	18.03	0.610	0.710
H	-	7.92	-	0.312

All JEDEC dimensions and notes apply

## CASE 6

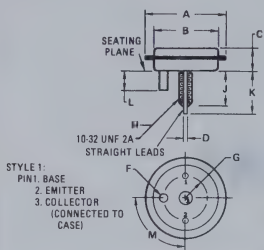


STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR  
(CONNECTED TO CASE)

DIM	MIN	MAX	MIN	MAX
A	-	33.25	-	1.313
B	-	25.53	-	1.005
C	-	15.88	-	0.625
D	-	3.56	-	0.141
E	8.76 BSC	-	0.345 BSC	-
F	28.58	34.33	1.125	1.375
G	9.53	12.70	0.375	0.500
H	36.10	-	1.500	-
I	7.54	7.92	0.190	0.312
M	90° BSC	-	90° BSC	-



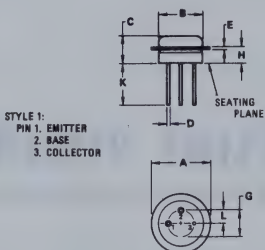
**CASE 7-02 TO-68**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	31.75	-	1.250
B	25.15	-	0.990	-
C	8.99	12.70	0.275	0.500
D	1.02	2.41	0.040	0.095
E	2.29	3.56	0.090	0.140
F	8.51	9.02	0.335	0.355
G	4.212	4.310	0.1658	0.1687
H	9.52	12.70	0.375	0.500
K	15.49	18.03	0.610	0.710
L	2.54	7.92	0.100	0.312
M	85°	90°	85°	95°

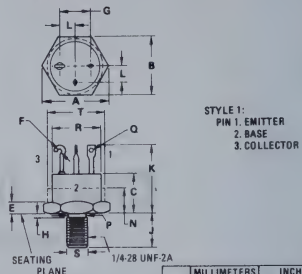
All JEDEC dimensions and notes apply

## CASE 8



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.86	16.51	0.585	0.650
B	12.32	12.57	0.485	0.485
C	8.10	7.62	0.240	0.300
D	0.69	0.84	0.027	0.033
E	0.51	1.02	0.020	0.040
G	7.16 BSC		0.282 BSC	
H	4.19	4.70	0.165	0.185
K	9.14	11.18	0.360	0.440
L	3.58 BSC		0.141 BSC	

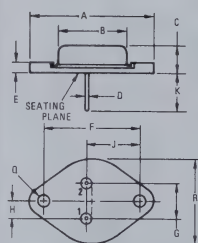
**CASE 9 TO-61**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.30	20.07	0.760	0.791
B	16.94	17.45	0.667	0.687
C	8.26	11.58	0.325	0.460
E	2.29	3.81	0.090	0.150
F	1.17	1.96	0.046	0.077
G	8.64	10.54	0.340	0.415
H		2.29		0.090
J	10.72	11.56	0.422	0.455
K	16.26	22.23	0.640	0.875
L	4.32	5.41	0.170	0.212
N		6.86		0.270
P	5.59	6.32	0.220	0.249
Q	1.19	1.83	0.047	0.072
R	14.48	15.49	0.570	0.610
S	5.651	5.761	0.2225	0.2268
T	15.49	17.45	0.610	0.687

Collector connected to case

## CASE 11



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	7.62	0.250	0.300
D	0.99	1.09	0.039	0.043
E	—	3.43	—	0.135
F	29.90	30.40	1.177	1.195
G	10.67	11.18	0.420	0.440
H	5.33	5.59	0.210	0.220
I	16.64	17.15	0.655	0.675
J	11.18	12.19	0.440	0.480
Q	3.84	4.09	0.151	0.161
R	—	26.67	—	1.050

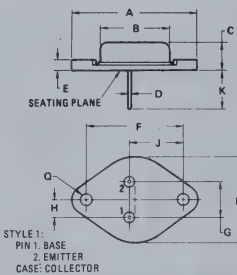
Collector connected to case

STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE: COLLECTOR

STYLE 2:  
PIN 1. EMITTER  
2. BASE  
CASE: COLLECTOR

NOTE:  
1. DIM "Q" IS DIA.

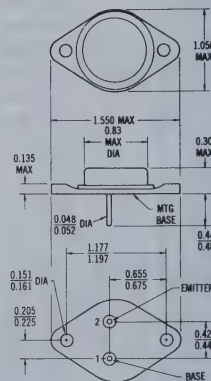
## CASE 11A



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	—	7.62	—	0.300
D	1.22	1.32	0.048	0.052
E	—	3.43	—	0.135
F	29.90	30.40	1.177	1.197
G	10.67	11.18	0.420	0.440
H	5.33	5.59	0.210	0.220
J	16.54	17.15	0.655	0.675
K	8.13	10.67	0.320	0.420
Q	3.84	4.09	0.151	0.161
R	—	26.67	—	1.050

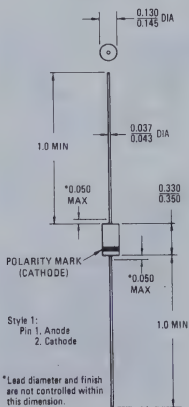
Collector connected to case

## CASE 12



Collector connected to case  
(TO-3 Except Pin Diameter)

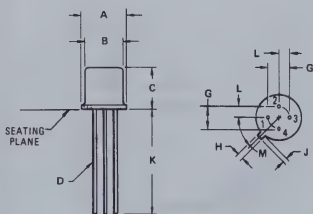
## CASE 17



Style 1:  
Pin 1, Anode  
2. Cathode

\*Lead diameter and finish are not controlled within this dimension.

**CASE 20 TO-72**



	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.209	0.230	5.310	5.840
B	0.178	0.196	4.520	4.960
C	0.170	0.210	4.320	5.330
D	0.016	0.019	0.408	0.483
G	0.100 TYP		2.54 TYP	
H	0.036	0.046	0.914	1.140
J	0.028	0.048	0.711	1.220
K	0.500	-	12.700	-
L	0.060 TYP		1.270 TYP	
M	.45° TYP		.45° TYP	

All JEDEC dimensions and notes apply

## CASE 20 STYLES



STYLE 1

PIN 1.	SOURCE
2.	DRAIN
3.	GATE
4.	CASE LEAD

**STYLE 6**

<b>PIN 1.</b>	<b>DRAIN</b>
<b>2.</b>	<b>SOURCE AND</b>
	<b>SUBSTRATE</b>
<b>3.</b>	<b>GATE</b>
<b>4.</b>	<b>SOURCE AND</b>
	<b>SUBSTRATE</b>

STYLE 2

PIN 1.	SOURCE
2.	GATE
3.	DRAIN
4.	SUBSTRATE AND CASE LEAD

STYLE 7

PIN 1.	DRAIN
2.	SOURCE
3.	GATE
4.	CASE AND SUBSTRATE

STYLE 3

PIN 1.	DRAIN
2.	SOURCE
3.	GATE
4.	CASE LEAD

STYLE 8

PIN 1.	EMITTER 2
2.	BASE 1
3.	COLLECTOR
4.	EMITTER 1
	BASE 2

STYLE 4

PIN 1.	SOURCE
2.	GATE
3.	DRAIN
4.	GATE 2 - SUBSTRATE AND CASE

BASE 2

STYLE 9

PIN 1. DRAIN  
2. GATE 2  
3. GATE 1  
4. SOURCE,  
SUBSTRATE  
AND CASE

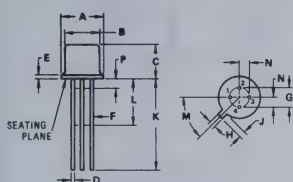
STYLE 5

PIN 1.	SOURCE
2.	GATE 1
3.	DRAIN
4.	CASE

STYLE 10  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR  
4. CASE



## CASE 21-02 TO-17

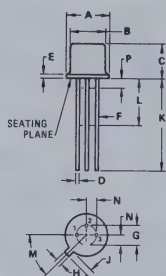


DIM	MIN	MAX	MIN	MAX
A	4.70	5.46	0.185	0.215
B	3.81	4.27	0.150	0.168
C	4.19	5.33	0.165	0.210
D	0.406	0.533	0.016	0.021
E	—	0.762	—	0.030
F	0.406	0.483	0.016	0.019
G	1.90	BSC	0.071	BSC
H	0.762	1.14	0.030	0.045
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC	45° BSC	—	—
N	0.914	BSC	0.036	BSC
P	—	1.27	—	0.050

STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR  
4. SHIELD

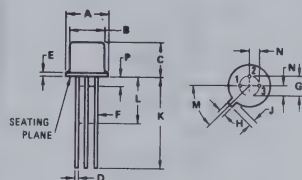
All JEDEC dimensions and notes apply

## CASE 22-01



DIM	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.48	0.016	0.019
G	2.54	BSC	0.100	BSC
H	0.91	1.17	0.036	0.048
J	0.71	1.22	0.028	0.048
K	12.70	—	0.500	—
M	45° BSC	45° BSC	—	—
N	1.27	BSC	0.050	BSC

## CASE 22-03 TO-18



DIM	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.406	0.533	0.016	0.021
E	—	0.762	—	0.030
F	0.406	0.483	0.016	0.019
G	2.54	BSC	0.100	BSC
H	0.914	1.17	0.036	0.048
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC	45° BSC	—	—
N	1.27	BSC	0.050	BSC
P	—	1.27	—	0.050

All JEDEC notes and dimensions apply.

## CASE 22 STYLES



STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 2:  
PIN 1. SOURCE/SUBSTRATE  
AND CASE  
2. GATE  
3. DRAIN

STYLE 3:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 4:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE & CASE

STYLE 5:  
PIN 1. EMITTER  
2. BASE 1  
3. BASE 2

STYLE 6:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

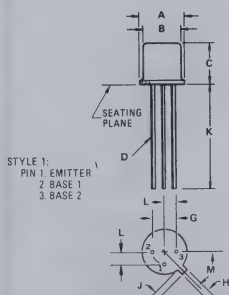
STYLE 7:  
PIN 1. ANODE  
2. BASE  
3. CATHODE

STYLE 8:  
PIN 1. GATE  
2. ANODE 1  
3. ANODE 2

STYLE 9:  
PIN 1. ANODE 2  
2. ANODE 1  
3. GATE (CONNECTED TO CASE)

STYLE 10:  
PIN 1. BASE  
2. EMITTER  
3. BASE

## CASE 22A

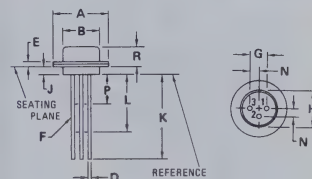


STYLE 1:  
PIN 1. EMITTER  
2. BASE 1  
3. BASE 2

STYLE 2:  
PIN 1. EMITTER  
2. BASE 2  
3. BASE 1

DIM	MIN	MAX	MIN	MAX
A	0.209	0.230	5.310	5.840
B	0.178	0.195	4.520	4.950
C	0.170	0.210	4.320	5.330
D	0.016	0.019	0.406	0.483
G	0.100 TYP	—	2.54 TYP	—
H	0.036	0.048	0.914	1.170
J	0.028	0.048	0.711	1.220
K	0.500	—	12.700	—
L	0.050 TYP	—	1.270 TYP	—
M	45° TYP	—	45° TYP	—

## CASE 23 TO-107

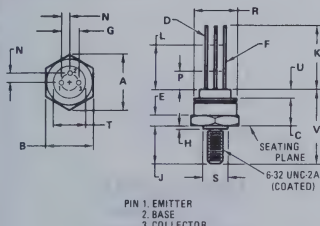


STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

DIM	MIN	MAX	MIN	MAX
A	8.13	8.89	0.320	0.350
B	5.08	5.46	0.200	0.215
D	0.407	0.533	0.016	0.021
E	—	0.76	—	0.030
F	0.407	0.492	0.016	0.019
G	2.54	BSC	0.100	BSC
H	4.07	4.32	0.160	0.170
J	1.15	1.52	0.045	0.060
K	12.70	—	0.500	—
L	6.35	—	0.250	—
N	1.27	BSC	0.050	BSC
P	—	1.27	—	0.050
R	2.67	3.42	0.106	0.135

All JEDEC dimensions and notes apply

## CASE 24 TO-102

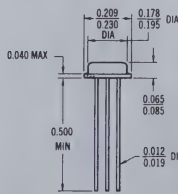


PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

DIM	MIN	MAX	MIN	MAX
A	10.49	11.00	0.413	0.433
B	9.19	9.53	0.362	0.375
C	5.33	5.72	0.210	0.225
D	0.406	0.533	0.016	0.021
E	1.65	1.78	0.065	0.070
F	0.406	0.483	0.016	0.019
G	2.54	BSC	0.100	BSC
H	0.508	0.889	0.020	0.035
J	6.73	7.42	0.265	0.292
K	12.70	—	0.500	—
L	6.35	—	0.250	—
N	1.27	BSC	0.050	BSC
P	—	1.27	—	0.050
R	8.89	9.14	0.350	0.360
S	4.45	4.83	0.175	0.190
T	4.11	4.29	0.162	0.168
U	1.14	1.52	0.045	0.060

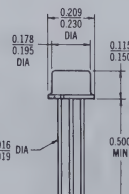
All JEDEC dimensions and notes apply

## CASE 26 TO-46



All JEDEC dimensions and notes apply

## CASE 27 TO-52



STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 2:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE & CASE

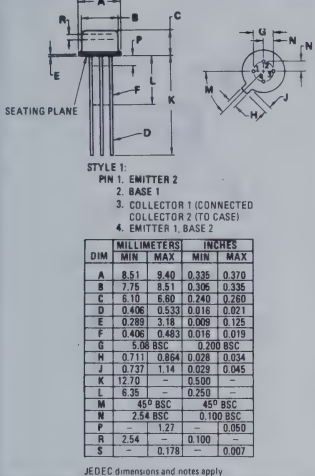
All JEDEC dimensions and notes apply



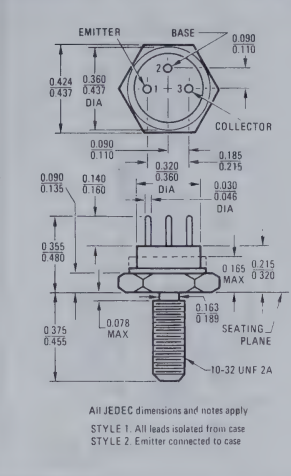




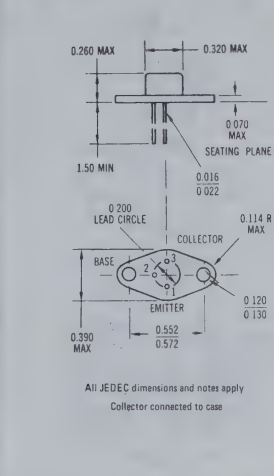
CASE 34A T0-12



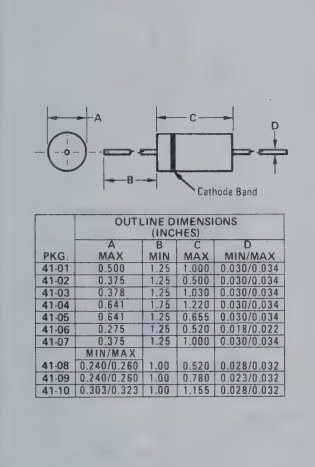
CASE 36 T0-60



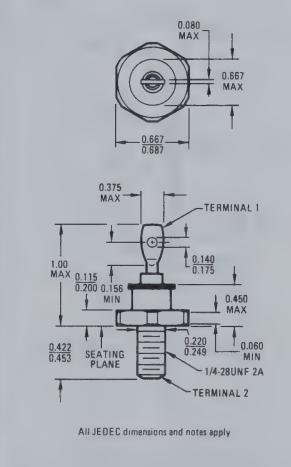
CASE 39 T0-37



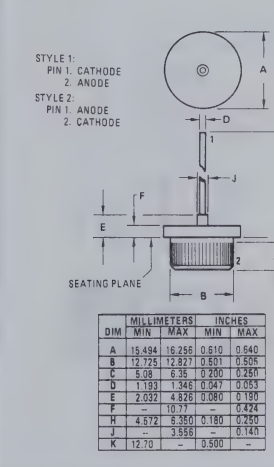
CASE 41



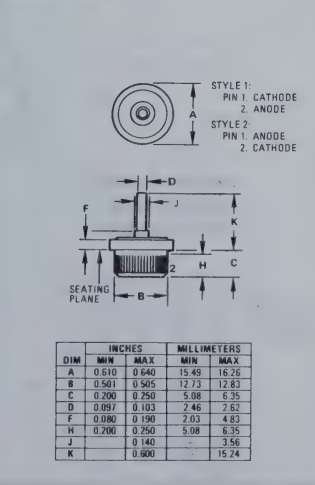
CASE 42A D0-5



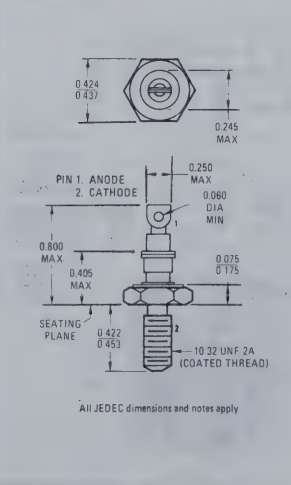
CASE 43-02 D0-21



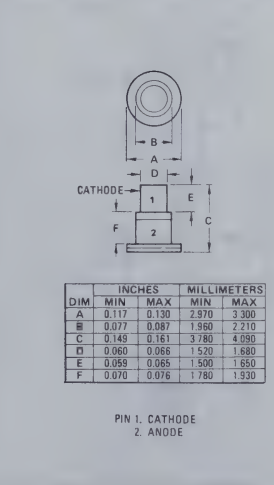
CASE 43-04



CASE 44 D0-4

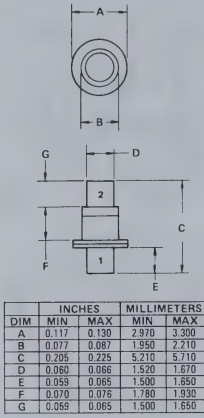


CASE 45



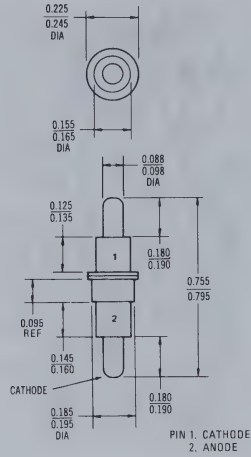


## CASE 46

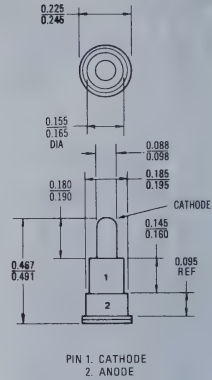


PIN 1. CATHODE  
2. ANODE

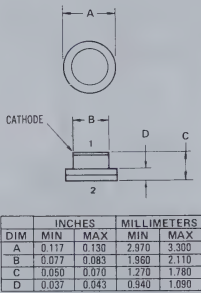
## CASE 47



## CASE 47A

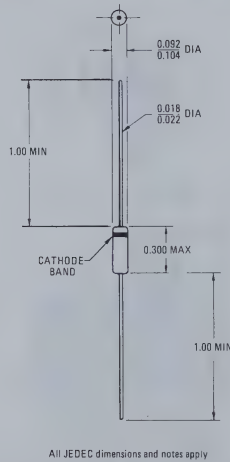


## CASE 48

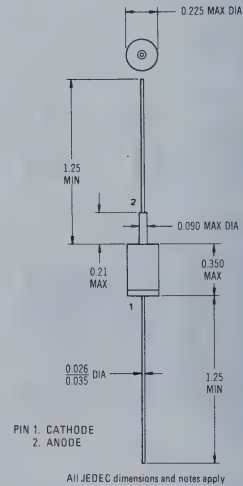


PIN 1. CATHODE  
2. ANODE

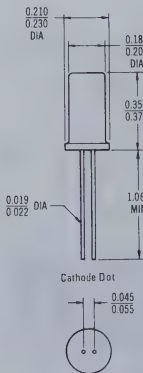
## CASE 51 DO-7



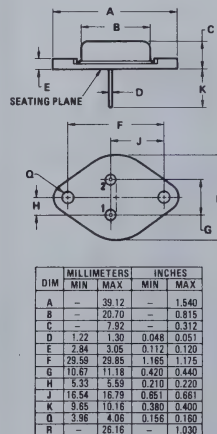
## CASE 52 DO-13



## CASE 53



## CASE 54



STYLE 1: (THY)  
PIN 1. ANODE  
2. GATE  
CASE: CATHODE

STYLE 2: (THY)  
PIN 1. GATE  
2. CATHODE  
CASE: ANODE

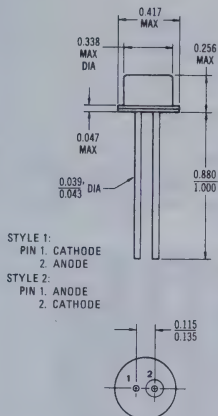
STYLE 3: (ZENER)  
PIN 1. CATHODE  
2. CATHODE  
CASE: ANODE

STYLE 4: (ZENER)  
PIN 1. ANODE  
2. ANODE  
CASE: CATHODE

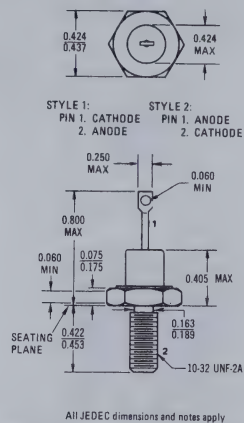
Dimensions are in  
inches unless  
otherwise noted



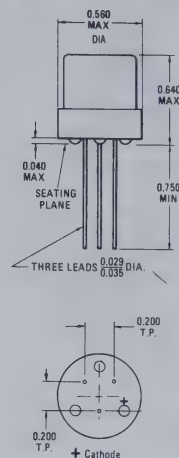
## CASE 55



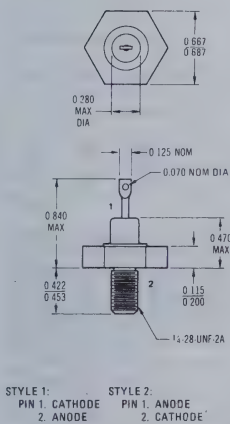
## CASE 56 DO-4



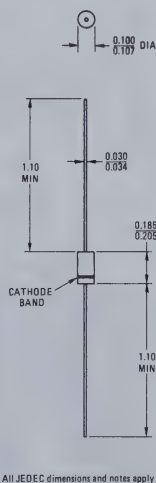
## CASE 57



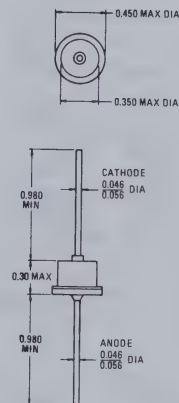
## CASE 58



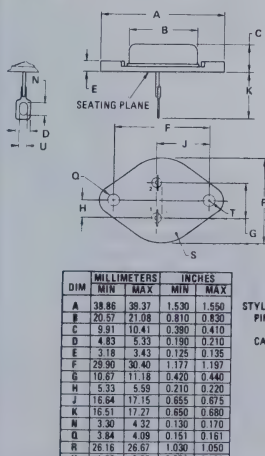
## CASE 59 DO-41



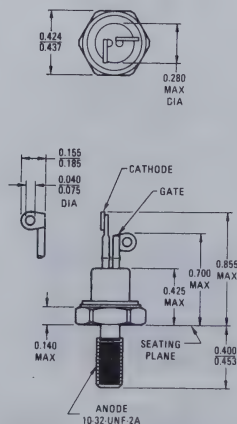
## CASE 60



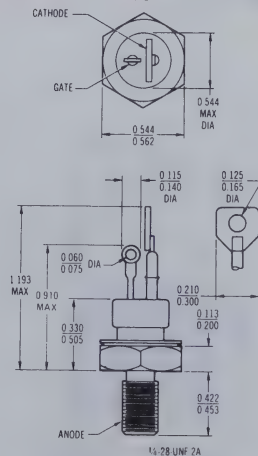
## CASE 61 TO-41



## CASE 63

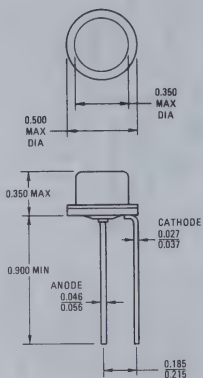


## CASE 64 TO-48

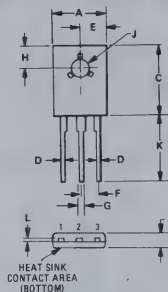




## CASE 70



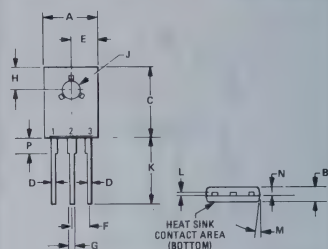
## CASE 77-02



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.270	0.330	6.860	8.380
B	0.070	0.130	1.770	3.300
C	0.390	0.450	9.910	11.430
D	0.020	0.026	0.508	0.660
E	0.150 NOM		3.810 NOM	
F	0.090 TP		2.290 TP	
G	0.025	0.035	0.635	0.889
H	0.130	0.175	3.300	4.450
J	0.115	0.118	2.910	3.000
K	0.595	0.655	15.110	16.650
L	0.015	0.025	0.381	0.635

(See page 8-38 for lead form availability.)

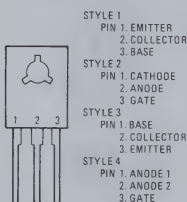
## CASE 77-03



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.295	0.305	7.490	7.750
B	0.095	0.105	2.410	2.670
C	0.425	0.435	10.800	11.050
D	0.020	0.026	0.508	0.560
E	0.145	0.155	3.680	3.940
F	0.093 TP		3.60 TP	
G	0.025	0.035	0.635	0.889
H	0.148	0.158	3.760	4.010
J	0.115	0.118	2.920	3.000
K	0.595	0.645	15.110	16.380
L	0.015	0.025	0.381	0.635
M	30° TP		30° TP	
N	0.045	0.055	1.140	1.400
P	0.085	0.095	2.160	2.410

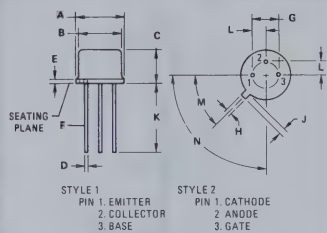
(See page 8-38 for lead form availability.)

## CASE 77STYLES



NOTE:  
1. MT = MAIN TERMINAL

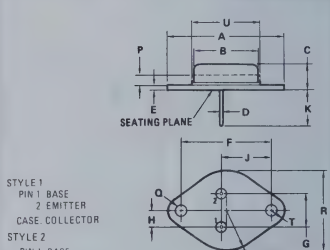
## CASE 79 TO-39



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.350	0.370	8.890	9.400
B	0.315	0.335	8.000	8.510
C	0.240	0.260	6.100	6.600
D	0.016	0.019	0.406	0.483
E	0.009	0.0125	0.229	0.318
F	0.015	0.019	0.406	0.483
G	0.190	0.210	4.830	5.330
H	0.028	0.034	0.711	0.864
J	0.029	0.040	0.737	1.020
K	0.500	—	12.700	—
L	0.100 TP		2.540 TP	
M	45° NOM		45° NOM	
N	90° NOM		90° NOM	

All JEDEC dimensions and notes apply

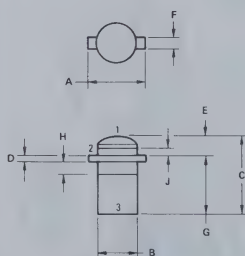
## CASE 80-02 TO-66



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
B	11.94	12.70	0.470	0.500
C	6.35	8.64	0.250	0.340
D	0.71	0.86	0.028	0.034
E	1.27	1.91	0.050	0.075
F	24.33	24.43	0.958	0.962
G	4.83	5.33	0.190	0.210
H	2.41	2.67	0.095	0.105
J	14.48	14.99	0.570	0.590
K	9.14	—	0.360	—
P	—	1.27	—	0.050
Q	3.61	3.86	0.142	0.152
S	—	8.89	—	0.350
T	—	3.68	—	0.145
U	—	15.75	—	0.620

All JEDEC Dimensions and Notes Apply

## CASE 81A-01

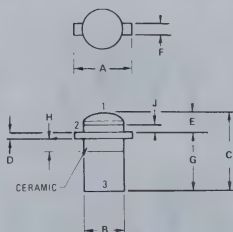


	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.083	0.093	2.110	2.360
B	0.058	0.062	1.470	1.570
C		0.125		3.180
D	0.003	0.007	0.076	0.178
E	0.023	0.029	0.584	0.737
F	0.018	0.022	0.457	0.559
G	0.082	0.094	2.080	2.390
H	0.014	0.020	0.356	0.508
J	0.008	0.012	0.203	0.305

STYLE 1:  
PIN 1. LENS  
2. EMITTER  
3. COLLECTOR

STYLE 2:  
PIN 1. LENS  
2. ANODE  
3. CATHODE

## CASE 81A-02



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.083	0.093	2.11	2.36
B	0.058	0.062	1.47	1.57
C		0.105		2.67
D	0.003	0.007	0.076	0.178
E		0.029		0.737
F	0.018	0.022	0.457	0.559
G	0.062	0.072	1.57	1.83
H	0.014	0.020	0.356	0.508
J	0.008	0.012	0.203	0.305

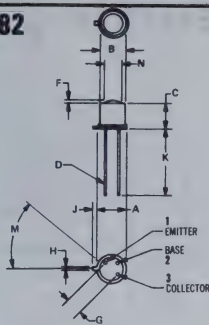
STYLE 1:  
PIN 1. LENS  
2. EMITTER  
3. COLLECTOR

STYLE 2:  
PIN 1. LENS  
2. ANODE  
3. CATHODE

Dimensions are in inches unless otherwise noted



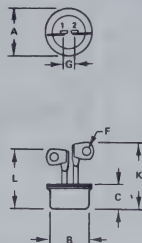
## CASE 82



NOTES: Leads are gold plated kover  
Collector internally connected to case  
Package weight ~ 0.45 grams

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.209	0.230	5.31	5.84
B	0.178	0.195	4.52	4.95
C	0.180	0.210	4.57	5.33
D	0.016	0.019	0.406	0.483
F	0.020	0.040	0.508	1.02
G	0.100 TYP		2.54 TYP	
H	0.009	0.046	0.229	1.13
J	0.033	0.048	0.838	1.22
K	0.500		12.70	
M	450		45.7	
N	0.132	0.158	3.35	4.01

## CASE 85



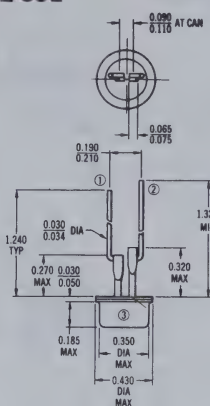
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	10.92	—	0.430
B	—	8.89	—	0.350
C	—	5.97	—	0.235
F	1.78 TYP		0.070 TYP	
G	2.29	2.79	0.090	0.110
K	—	14.73	—	0.580
L	—	15.46	—	0.610

NOTE:  
1. DIM "G" MEASURED AT CAN

STYLE 1:  
PIN 1. GATE  
2. CATHODE  
CAN. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
CAN. MAIN TERMINAL 2

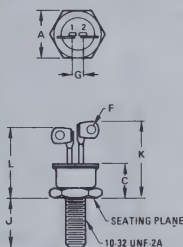
## CASE 85L



STYLE 1:  
PIN 1. GATE  
2. CATHODE  
CAN. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
3. MAIN TERMINAL 2

## CASE 86



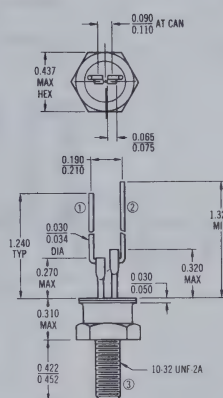
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	11.10	—	0.437
C	—	7.87	—	0.310
F	1.78 TYP		0.070 TYP	
G	2.29	2.79	0.090	0.110
J	10.72	11.48	0.422	0.452
K	—	16.76	—	0.660
L	—	15.49	—	0.610

NOTE:  
1. DIM "G" MEASURED AT CAN.

STYLE 1:  
PIN 1. GATE  
2. CATHODE  
STUD. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
STUD. MAIN TERMINAL 2

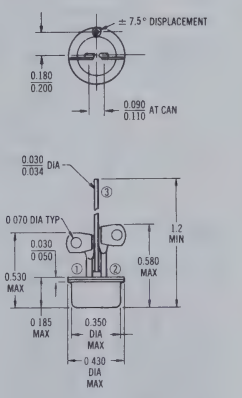
## CASE 86L



STYLE 1:  
PIN 1. GATE  
2. CATHODE  
STUD. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
3. MAIN TERMINAL 2

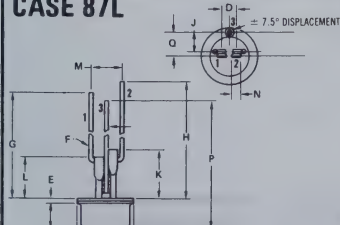
## CASE 87



STYLE 1:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
3. MAIN TERMINAL 2

## CASE 87L



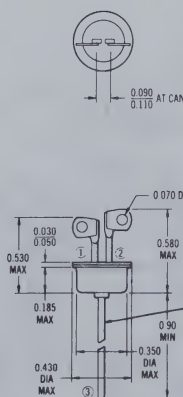
NOTES:  
1. DIM. "D" MEASURED AT CAN.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	—	0.430	—	10.920
B	—	0.350	—	8.890
C	—	0.185	—	4.700
D	0.090	0.110	2.290	2.790
E	0.030	0.050	0.762	1.270
F	0.030	0.034	0.762	0.864
G	1.240 TYP		31.500 TYP	
H	1.320		33.530	
J	0.135	0.145	3.430	3.680
K	—	0.320	—	8.130
L	—	0.270	—	6.860
M	0.190	0.210	4.830	5.330
N	0.085	0.075	1.950	1.910
P	1.200		30.480	
Q	0.180	0.200	4.570	5.080

STYLE 1:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
3. MAIN TERMINAL 2

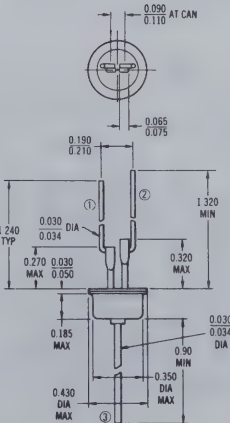
## CASE 88



STYLE 1:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
3. MAIN TERMINAL 2

## CASE 88L

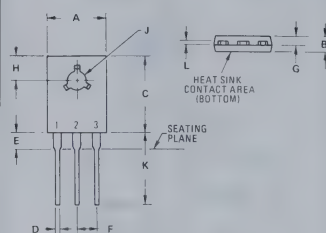


STYLE 1:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
3. MAIN TERMINAL 2



## CASE 90-04

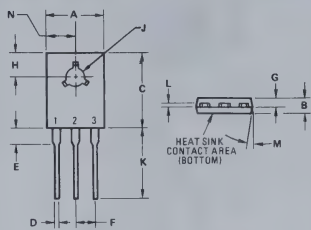


DIM	MIN	MAX	MIN	MAX
A	0.490	0.520	12.450	13.210
B	0.120	0.150	3.050	3.810
C	0.628	0.658	15.950	16.710
D	0.043	0.049	1.090	1.250
E	-	0.125	-	3.180
F	0.165 TP	-	4.220 TP	-
G	0.075	0.085	1.910	2.160
H	0.177	0.197	4.500	5.000
I	0.138	0.148	3.510	3.760
J	0.590	0.650	14.950	16.510
K	0.030	0.034	0.762	0.864

NOTE  
DIM "E" UNCONTROLLED

(See page 8-38 for lead form availability.)

## CASE 90-05

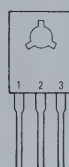


DIM	MIN	MAX	MIN	MAX
A	0.495	0.505	12.570	12.830
B	0.125	0.135	3.180	3.430
C	0.635	0.645	16.130	16.380
D	0.043	0.049	1.090	1.240
E	0.105	0.115	2.670	2.920
F	0.165 TP	-	4.220 TP	-
G	0.075	0.085	1.910	2.160
H	0.185	0.195	4.700	4.950
I	0.138	0.148	3.510	3.760
J	0.595	0.645	15.110	16.380
K	0.032	0.034	0.813	0.864
L	0.030	0.034	0.762	0.864
M	0.030	0.034	0.762	0.864
N	0.245	0.255	6.220	6.480

NOTE  
DIM "E" UNCONTROLLED

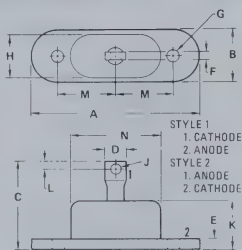
(See page 8-38 for lead form availability.)

## CASE 90 STYLES



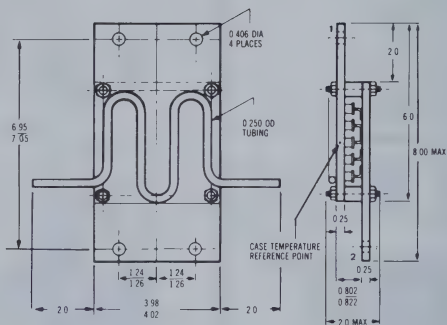
- STYLE 1  
PIN 1. CATHODE  
2. ANODE  
3. GATE
- STYLE 2  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE
- STYLE 3  
PIN 1. CATHODE  
2. GATE  
3. ANODE
- STYLE 4  
PIN 1. MT 1  
2. MT 2  
3. GATE

## CASE 100



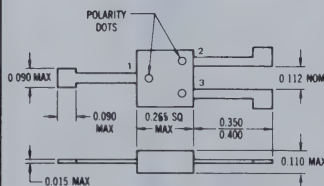
DIM	MIN	MAX	MIN	MAX
A	-	55.88	-	2.20
B	-	16.51	-	0.650
C	29.21 NOM.	-	1.15 NOM.	-
D	6.60 NOM.	-	0.260 NOM.	-
E	-	3.43	-	0.135
F	2.03 NOM.	-	0.080 NOM.	-
G	4.39 DIA.	-	0.173 DIA.	-
H	15.24	-	0.600	-
J	3.68 DIA.	-	0.145 DIA.	-
K	16.13	-	0.635	-
L	2.62	-	0.103	-
M	18.80	-	0.740	-
N	30.48	-	1.20	-

## CASE 105



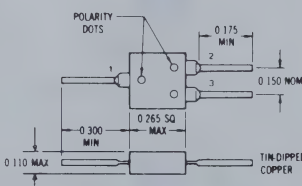
- STYLE 1  
PIN 1. CATHODE  
2. ANODE
- STYLE 2  
PIN 1. ANODE  
2. CATHODE

## CASE 106



- STYLE 1  
PIN 1. AC  
2. POSITIVE  
3. NEGATIVE
- STYLE 2  
PIN 1. POSITIVE  
2. AC  
3. AC
- STYLE 3  
PIN 1. NEGATIVE  
2. AC  
3. AC

## CASE 107

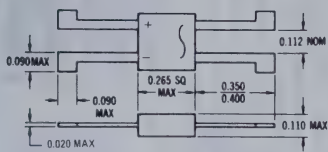


- STYLE 1  
PIN 1. AC  
2. POSITIVE  
3. NEGATIVE
- STYLE 2  
PIN 1. POSITIVE  
2. AC  
3. AC
- STYLE 3  
PIN 1. NEGATIVE  
2. AC  
3. AC

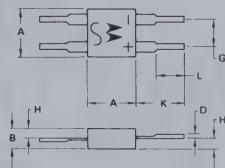
Dimensions are in  
inches unless  
otherwise noted



CASE 108

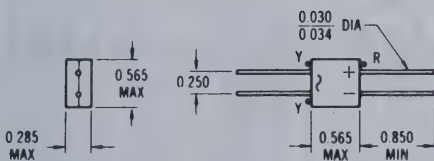


CASE 109

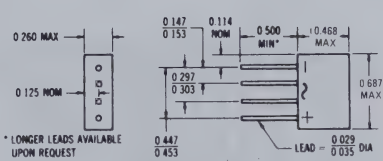


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.10	6.73	0.240	0.265
B	2.29	2.78	0.090	0.110
C	0.64	0.69	0.025	0.025
D	3.88	3.94	0.145	0.155
E	1.02	1.27	0.040	0.050
F	6.80	8.64	0.260	0.340
G	3.81	5.08	0.150	0.200

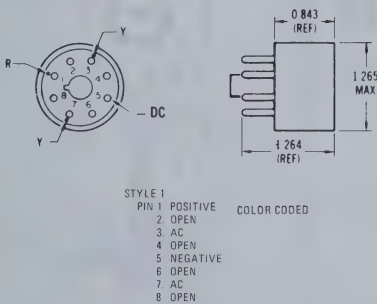
CASE 110



CASE 111



CASE 112

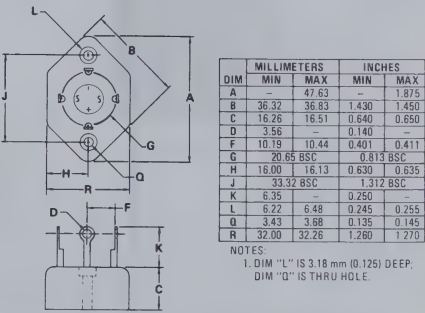


STYLE 1

PIN 1	POSITIVE
2	OPEN
3	AC
4	OPEN
5	NEGATIVE
6	OPEN
7	AC
8	OPEN

COLOR CODED

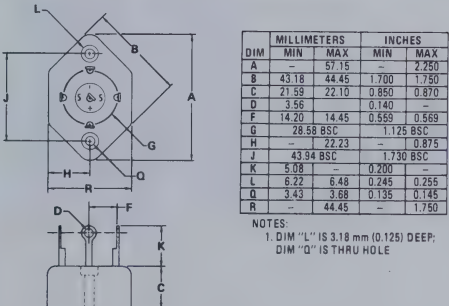
CASE 113



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	47.63	-	1.875
B	36.32	36.93	1.430	1.450
C	16.26	16.51	0.640	0.650
D	3.56	-	0.140	-
E	10.19	10.44	0.401	0.411
F	20.65 BSC	0.813 BSC	-	-
G	16.00	16.13	0.630	0.635
H	33.32 BSC	1.312 BSC	-	-
I	6.35	-	0.250	-
J	6.22	6.48	0.245	0.255
K	3.43	3.68	0.135	0.145
L	32.00	32.26	1.260	1.270

NOTES:  
1. DIM "L" IS 3.18 mm (0.125) DEEP.  
DIM "Q" IS THRU HOLE.

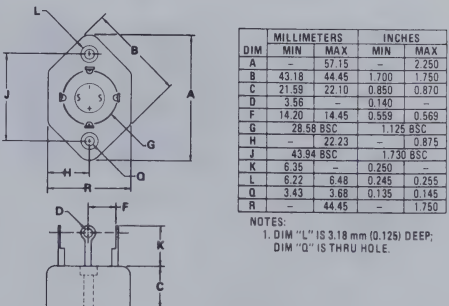
CASE 114



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	57.15	-	2.250
B	43.18	44.45	1.700	1.750
C	21.59	22.10	0.850	0.870
D	3.56	-	0.140	-
E	14.20	14.45	0.559	0.569
F	28.58 BSC	1.125 BSC	-	-
G	-	22.23	-	0.875
H	43.94 BSC	1.730 BSC	-	-
I	5.08	-	0.200	-
J	6.22	6.48	0.245	0.255
K	3.43	3.68	0.135	0.145
L	-	44.45	-	1.750

NOTES:  
1. DIM "L" IS 3.18 mm (0.125) DEEP.  
DIM "Q" IS THRU HOLE.

CASE 115

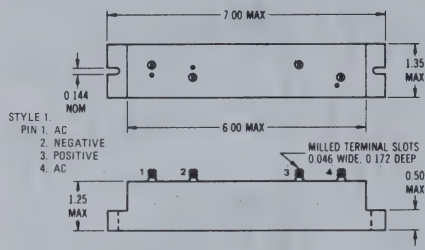


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	57.15	-	2.250
B	43.18	44.45	1.700	1.750
C	21.59	22.10	0.850	0.870
D	3.56	-	0.140	-
E	14.20	14.45	0.559	0.569
F	28.58 BSC	1.125 BSC	-	-
G	-	22.23	-	0.875
H	43.94 BSC	1.730 BSC	-	-
I	5.08	-	0.200	-
J	6.22	6.48	0.245	0.255
K	3.43	3.68	0.135	0.145
L	-	44.45	-	1.750

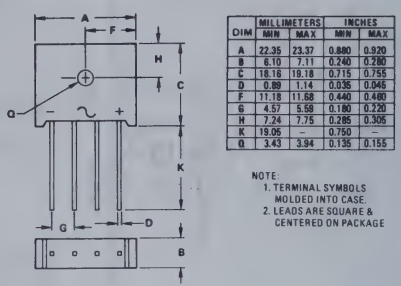
NOTES:  
1. DIM "L" IS 3.18 mm (0.125) DEEP.  
DIM "Q" IS THRU HOLE.



CASE 116



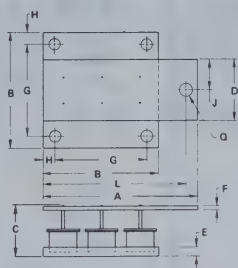
CASE 117



DIM	MIN	MAX	MIN	MAX
A	22.35	23.37	0.880	0.920
B	6.10	7.11	0.240	0.280
C	18.16	19.18	0.715	0.755
D	0.89	1.14	0.035	0.045
F	11.18	11.68	0.440	0.460
G	4.57	5.58	0.180	0.220
H	7.24	7.75	0.285	0.305
K	19.05	-	0.750	-
Q	3.43	3.94	0.135	0.155

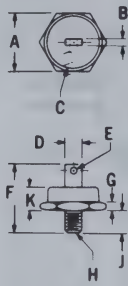
NOTE:  
1. TERMINAL SYMBOLS  
MOLDED INTO CASE  
2. LEADS ARE SQUARE &  
CENTERED ON PACKAGE

CASE 119



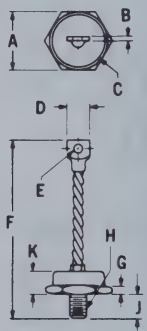
DIM	MIN	MAX	MIN	MAX
A	50.29	51.31	1.980	2.020
B	37.59	38.61	1.480	1.520
C	-	16.51	-	0.650
D	20.24	21.01	0.797	0.827
E	2.92	3.43	0.115	0.135
F	1.32	1.83	0.052	0.072
G	29.97	30.99	1.180	1.220
H	3.56	4.06	0.140	0.160
J	10.06	10.57	0.395	0.415
L	46.74	47.74	1.840	1.880
Q	3.30	3.81	0.130	0.150

CASE 126  
CASE 128

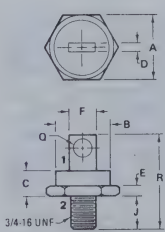


DIMENSION	CASE 126	CASE 128
A (hex)	1.75	2.250
B (max)	0.260	0.320
C (max dia)	1.72	2.20
D (max)	0.760	1.10
E (dia)	0.375	0.562
F (max)	3.0	3.72
G (typ)	0.375	0.375
H (thread)	3/16 UNF	3/16 UNF
J (max)	1.00	1.00
K (max)	1.10	1.10

CASE 130  
CASE 131  
CASE 132



CASE 127



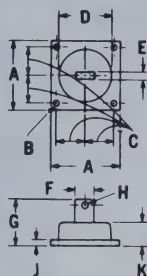
DIM	MIN	MAX	MIN	MAX
A	50.42	51.18	1.985	2.015
B	-	49.28	-	1.940
C	-	27.94	-	1.100
D	5.84	6.86	0.230	0.270
E	9.14	9.91	0.360	0.390
F	-	27.94	-	1.100
J	25.02	25.78	0.985	1.015
Q	14.02	14.53	0.552	0.572
R	-	88.90	-	3.500

PIN 1. CATHODE  
2. ANODE

DIMENSION	CASE 130	CASE 131	CASE 132
A (hex)	1.75	2.00	2.250
B (max)	0.155	0.200	0.260
C (max dia)	1.72	1.94	2.20
D (max)	0.64	1.00	1.155
E (dia)	0.343	0.531	0.562
F (max)	8.10	8.10	8.10
G (typ)	0.375	0.375	0.375
H (thread)	3/16 UNF	3/16 UNF	3/16 UNF
J (max)	1.00	1.00	1.00
K (max)	1.10	1.10	1.10

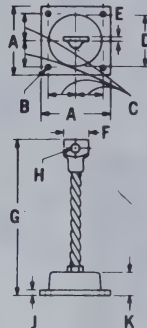


CASE 133  
CASE 134  
CASE 135  
CASE 136



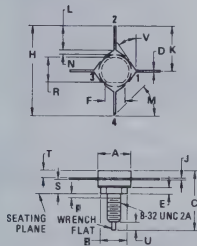
DIMENSION	CASE 133	CASE 134	CASE 135	CASE 136
A (typ)	2.25	3.00	3.00	3.25
B (dia)	0.203	0.281	0.281	0.281
C (max)	0.880	1.255	1.255	1.380
D (max dia)	1.720	2.100	2.200	2.885
E (max)	0.260	0.260	0.320	0.500
F (max)	0.760	1.100	1.100	1.30
G (max)	1.9	2.50	2.70	2.50
H (dia)	0.375	0.562	0.562	0.562
J (max)	0.260	0.260	0.260	0.260
K (max)	1.00	1.00	1.00	1.00

CASE 137  
CASE 138  
CASE 139



DIMENSION	CASE 137	CASE 138	CASE 139
A (typ)	2.25	3.00	3.00
B (dia)	0.203	0.281	0.281
C (max)	0.880	1.255	1.255
D (max dia)	1.720	2.100	2.20
E (max)	0.155	0.200	0.260
F (max)	0.64	1.00	1.155
G (max)	7.10	6.90	6.90
H (dia)	0.343	0.531	0.562
J (max)	0.260	0.260	0.260
K (max)	1.00	1.00	1.00

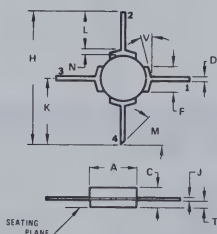
CASE 144B-03



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.63	18.48	0.694	0.735
D	0.64	0.89	0.025	0.035
E	1.78	2.03	0.070	0.080
F	5.59	5.84	0.220	0.230
G	26.16	27.69	1.030	1.090
H	0.10	0.15	0.004	0.006
I	13.06	13.84	0.515	0.545
J	7.11	7.37	0.280	0.290
K	40°	50°	40°	50°
L	1.27	1.52	0.050	0.060
M	1.27	1.27	0.050	0.050
N	7.59	7.80	0.299	0.307
O	4.01	4.52	0.158	0.178
P	2.16	2.41	0.085	0.095
Q	2.54	3.30	0.100	0.130
R	10°	20°	10°	20°

STYLE 1  
PIN 1: EMITTER  
2: BASE  
3: EMITTER  
4: COLLECTOR

CASE 144C-02



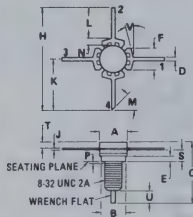
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	9.78	0.370	0.385
B	4.06	4.32	0.160	0.170
C	0.64	0.89	0.025	0.035
D	5.59	5.84	0.220	0.230
E	26.67	27.18	1.050	1.070
F	0.10	0.15	0.004	0.006
G	13.34	13.59	0.525	0.535
H	7.11	7.37	0.280	0.290
I	40°	50°	40°	50°
J	1.27	1.52	0.050	0.060
K	1.65	1.91	0.065	0.075
L	10°	20°	10°	20°

STYLE 1  
PIN 1: EMITTER  
2: BASE  
3: EMITTER  
4: COLLECTOR

Dimensions are in inches unless otherwise noted



## CASE 144D-04

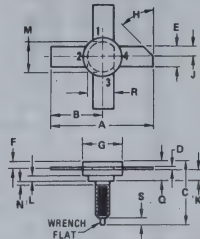


DIM	MIN	MAX	MIN	MAX
A	7.06	7.26	0.278	0.286
B	6.25	6.45	0.246	0.254
C	15.49	16.51	0.610	0.650
D	0.64	0.89	0.025	0.035
E	1.40	1.65	0.055	0.065
F	5.55	5.84	0.220	0.230
H	26.67	27.18	1.050	1.070
J	0.10	0.15	0.004	0.006
K	13.34	13.59	0.525	0.535
L	8.25	8.51	0.325	0.335
M	40°	50°	40°	50°
N	1.40	1.65	0.055	0.065
P	—	1.27	—	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.65	0.055	0.065
U	2.92	3.68	0.115	0.145
V	10°	20°	10°	20°

STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. EMITTER  
4. COLLECTOR

STYLE 2:  
PIN 1. BASE  
2. EMITTER  
3. BASE  
4. COLLECTOR

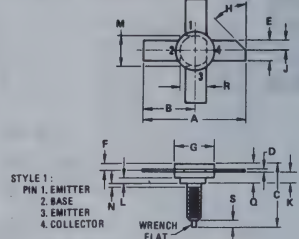
## CASE 145A-01



DIM	MIN	MAX	MIN	MAX
A	1.055	1.065	26.79	27.05
B	5.00	5.30	13.20	13.71
C	7.10	7.50	18.03	19.05
D	0.045	0.06	1.14	1.52
E	2.20	2.30	5.59	5.84
F	0.85	0.95	2.16	2.41
G	3.70	3.85	9.40	9.78
H	45° NOM	45° NOM	—	—
J	1.10	1.15	2.75	2.93
K	1.58	1.78	4.01	4.52
L	0.70	0.80	1.78	2.03
M	3.20	3.30	8.13	8.38
N	—	0.50	—	1.27
Q	2.50	2.75	6.35	6.89
R	2.99	3.07	7.59	7.80
S	1.00	1.30	2.54	3.30

NOTE:  
CASE 145A-01 USE 8-32NC2A STUD

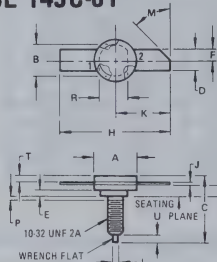
## CASE 145A-02



DIM	MIN	MAX	MIN	MAX
A	1.055	1.065	26.79	27.05
B	5.20	5.30	13.20	13.71
C	8.35	8.45	21.20	21.45
D	0.045	0.06	1.14	1.52
E	2.21	2.29	5.61	5.92
F	0.80	0.90	2.03	2.28
G	4.95	5.08	12.57	12.90
H	45° NOM	45° NOM	—	—
J	1.10	1.15	2.75	2.93
K	1.55	1.75	3.89	4.45
L	0.72	0.78	1.83	1.98
M	4.15	4.25	10.54	10.80
N	—	0.50	—	1.27
Q	2.45	2.75	6.31	6.89
R	3.85	3.94	9.78	10.01
S	1.00	1.30	2.54	3.30

NOTE:  
CASE 145A-02 USE 10-32NC2A STUD

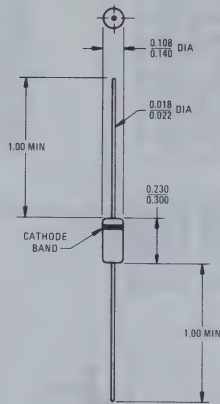
## CASE 145C-01



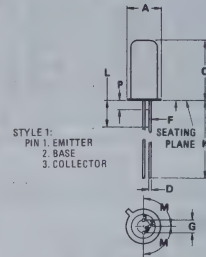
DIM	MIN	MAX	MIN	MAX
A	17.45	12.95	0.490	0.510
B	10.41	10.92	0.410	0.430
C	21.21	21.46	0.835	0.845
D	8.51	8.76	0.335	0.345
E	1.78	2.03	0.070	0.080
F	4.19	4.46	0.165	0.175
H	22.86	23.52	0.900	0.930
J	0.10	0.15	0.004	0.006
K	11.43	11.81	0.450	0.465
L	1.65	1.91	0.065	0.075
M	40°	50°	40°	50°
P	—	1.27	—	0.050
R	9.78	10.03	0.385	0.395
S	4.11	4.42	0.162	0.174
T	2.16	2.41	0.085	0.095
U	2.54	3.30	0.100	0.130

STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
STUD-EMITTER

## CASE 146 (D0-14)



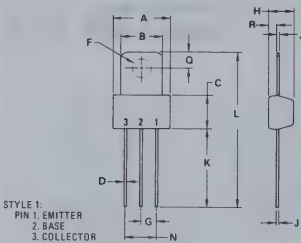
## CASE 149-02 (T0-1)



DIM	MIN	MAX	MIN	MAX
A	—	6.10	—	0.240
C	—	10.41	—	0.410
D	—	0.53	—	0.021
F	0.406	0.483	0.016	0.019
G	1.55	2.06	0.061	0.081
K	38.10	—	1.500	—
L	6.35	—	0.250	—
M	90° NOM	90° NOM	—	—
P	—	1.27	—	0.050

All JEDEC notes and dimensions apply

## CASE 152



STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

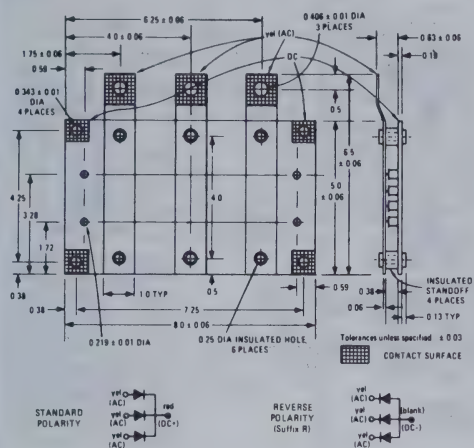
DIM	MIN	MAX	MIN	MAX
A	9.14	9.53	0.360	0.375
B	6.60	7.24	0.260	0.285
C	5.41	5.66	0.213	0.223
D	0.38	0.53	0.015	0.021
F	3.18	3.33	0.125	0.131
G	2.54 BSC	—	0.100 BSC	—
H	3.94	4.19	0.155	0.165
J	0.36	0.41	0.014	0.016
K	12.07	12.70	0.475	0.500
L	25.02	25.53	0.985	1.005
N	5.08 BSC	—	0.200 BSC	—
Q	2.39	2.68	0.094	0.106
R	1.14	1.40	0.045	0.065

Dimensions are in  
inches unless  
otherwise noted

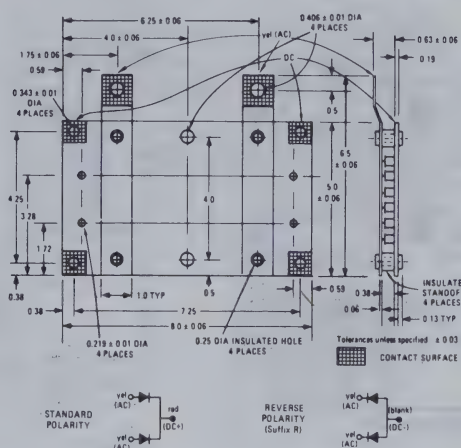
(See page 8-38 for lead form availability.)



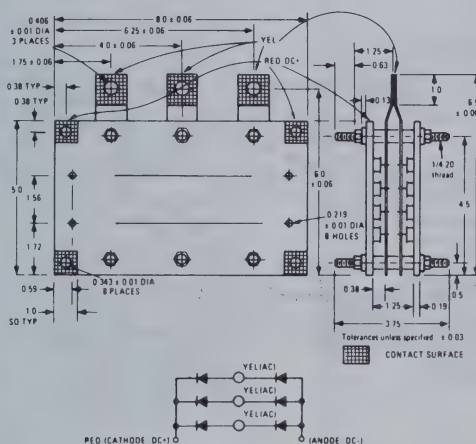
## CASE 154



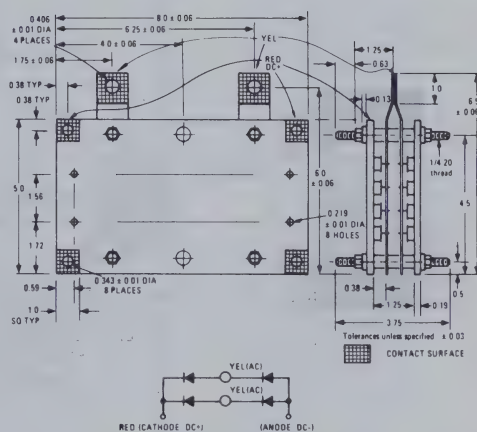
## CASE 154A



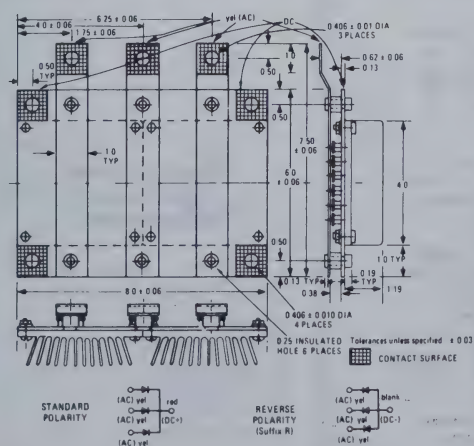
## CASE 155



## CASE 155A



## CASE 156



## CASE 156A

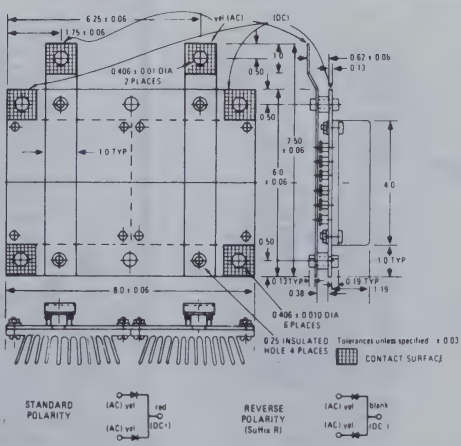




Figure 1: Dimensions and electrical connections of the 6X4 tube. The figure includes three views: a top view, a side view, and a pinout diagram. The top view shows a rectangular base with dimensions: 8.0 ± 0.06 (width), 7.75 (length), 4.0 ± 0.06 (distance between pins), 0.50 TYP (pin diameter), 0.406 ± 0.01 DIA (3 places) (pin diameter), 0.19 TYP (pin spacing), 1.19 (pin length), 0.89 (pin length), 1/16-20 THREAD (pin thread), 1.0 (pin length), 0.50 ± 0.06 (pin length), 0.50 (pin length), 7.0 ± 0.06 (pin length), 1.0 TYP (pin length), 1.0 (pin length), 0.50 TYP (pin length). The side view shows dimensions: 6.0 ± 0.06 (height), 5.0 (height), 5.5 (height), 7.0 ± 0.06 (height), 1.0 TYP (height), 1.0 (height), 0.50 TYP (height). The pinout diagram shows dimensions: 3.88 ± 0.06 (pin length), 0.19 TYP (pin length), 0.38 (pin length), 0.13 TYP (pin length), 0.06 (pin length), 3.75 (pin length). The electrical connections show: VEL (AC), VEL (AC), VEL (AC), RED (CATHODE DC-1), and 1ANODE DC-10.

Tolerances unless specified  $\pm$  .03

CONTACT SURFACE

Circuit diagram showing connections:

- YEL (AC) - Yellow AC connection
- RED (CATHODE DC-) - Red Cathode DC- connection
- (ANODE DC+) - Anode DC+ connection

Technical drawing of a 10-pin D-subminiature connector. The drawing includes a side view on the left and a front view on the right.

**Side View Dimensions:**

- Total length:  $6.0 \pm 0.05$
- Pin pitch:  $0.40 \text{ DIA THRU } 4 \text{ PLACES}$
- Pin diameter:  $0.075$
- Pin spacing:  $1.75 \pm 0.01$  (between pin groups)
- Overall width:  $4.00 \pm 0.02$

**Front View Dimensions:**

- Pin spacing:  $0.25$  (between pins)
- Pin diameter:  $0.075$
- Pin spacing:  $2.75$  (between pin groups)
- Pin spacing:  $0.25$  (between pin groups)
- Overall width:  $0.56 \pm 0.010$
- Pin spacing:  $2.0$  (between pin groups)

**Labels:**

- CONTACT SURFACES
- 0.40 DIA THRU 4 PLACES

[illegible]

Technical drawing of a JEDEC 18 pin package. The side view shows dimensions T (total length), R (lead length), D (lead thickness), Q (lead width), E (lead pitch), F (lead angle), H (body height), G (body width), K (body thickness), C (body diameter), N (body diameter), J (body diameter), P (body diameter), M (body diameter), L (body diameter), and S (body diameter). The top view shows dimensions A (body width), B (body width), and C (body diameter). The package is labeled 10-32 UNF-2A COATED and SEATING PLANE.

DIM	MILLIMETERS			INCHES		
	MIN	MAX		MIN	MAX	
B	10.77	11.10	0.424	0.437		
C	8.13	11.89	0.320	0.468		
E	2.29	3.81	0.090	0.150		
G	4.70	5.40	0.185	0.215		
H		1.98		0.078		
J	10.16	11.56	0.400	0.455		
K	14.48	19.38	0.570	0.763		
L	2.29	2.75	0.090	0.110		
N		6.35		0.250		
P	4.14	4.80	0.163	0.189		
Q	1.02	1.65	0.040	0.065		
R	0.09	0.95	0.016	0.380		
S	4.212	4.310	0.1658	0.1689		
T	9.85	11.10	0.390	0.437		

ALL JEDEC dimensions and notes apply  
Collector isolated from case

STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

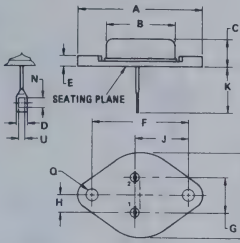
The drawing consists of two views of the 2N4351A transistor:

- Top View:** A hexagonal package with a central circular feature. Dimensions include:
  - Collector to Emitter distance: 0.200
  - Emitter to Base distance: 0.424 (0.437)
  - Base to Collector distance: 0.437
- Side View:** A perspective view of the package showing the mounting base and the lead structure. Dimensions include:
  - Lead height: 0.318 (0.380)
  - Lead thickness: 0.070 TYP
  - Lead diameter: 0.048 DIA (0.063)
  - Lead length: 0.570 (0.763)
  - Lead width: 0.320 (0.468)
  - Base diameter: 0.400 (0.455)
  - Base thickness: 0.080 (0.150)
  - Thread specification: 18-32 UNF-2A (COATED)

Dimensions are in inches unless otherwise noted



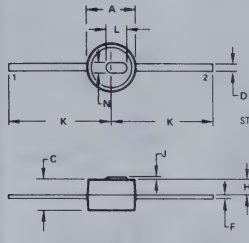
## CASE 161



DIM	MIN	MAX	MIN	MAX
A	28.37	1.550		
B	21.08	0.830		
C	9.14	0.360		
D	3.56	0.140		
E	3.43	0.135		
F	29.90	1.177	1.197	
G	10.67	0.420	0.440	
H	5.33	0.210	0.230	
J	16.54	0.655	0.675	
K	15.49	0.610	0.680	
L	3.05	0.120	0.130	
M	3.94	0.151	0.161	
N	26.67	1.050		
U	1.83	0.072		

STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE: COLLECTOR  
NOTE:  
1. LEADS ARE MASHED  
& PIERCED

## CASE 166-02

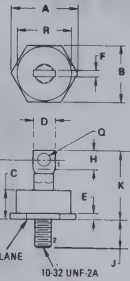


DIM	MIN	MAX	MIN	MAX
A	1.98	2.34	0.078	0.092
C	1.22	1.47	0.048	0.058
D	0.25	0.41	0.010	0.016
F	0.10	0.15	0.004	0.006
H	0.51	0.76	0.020	0.030
J	0.03	0.08	0.001	0.003
K	4.19	4.45	0.165	0.175
L	0.89	1.14	0.035	0.045
N	0.38	0.64	0.015	0.025

Optional Package with Raised  
Circular Tab Available, Specify  
Case 166-01.

STYLE 1:  
PIN 1. ANODE  
2. CATHODE

## CASE 167

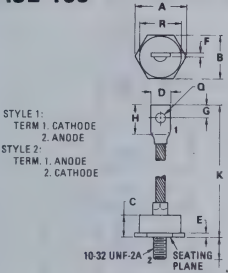


NOTES:  
1. CRIMPED LUG  
2. ANGULAR ORIENTATION  
OF LUG UNDEFINED.

DIM	MIN	MAX	MIN	MAX
A	—	36.83	—	1.450
B	31.37	32.13	1.235	1.265
C	13.72	17.91	0.540	0.705
D	12.70	13.34	0.500	0.525
E	2.92	3.43	0.115	0.135
F	2.67	3.43	0.105	0.135
G	29.21	34.28	1.150	1.350
H	12.70	—	0.500	—
J	10.77	12.70	0.424	0.500
K	34.93	44.45	1.375	1.750
Q	6.10	6.90	0.240	0.270
R	—	30.48	—	1.200

STYLE 1:  
PIN 1. CATHODE  
2. ANODE  
STYLE 2:  
PIN 1. ANODE  
2. CATHODE

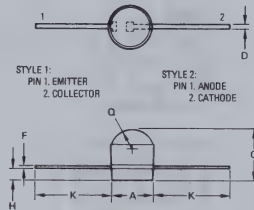
## CASE 168



STYLE 1:  
TERM 1. CATHODE  
2. ANODE  
STYLE 2:  
TERM 1. ANODE  
2. CATHODE

DIM	MIN	MAX	MIN	MAX
A	—	36.83	—	1.450
B	31.37	32.13	1.235	1.265
C	13.72	17.91	0.540	0.705
D	13.00	15.54	0.512	0.612
E	2.92	3.43	0.115	0.135
F	1.52	3.30	0.060	0.130
G	8.71	10.34	0.343	0.407
H	19.05	—	0.750	—
J	10.77	12.70	0.424	0.500
K	127.00	146.05	5.000	5.750
Q	6.76	7.52	0.266	0.296
R	—	30.48	—	1.200

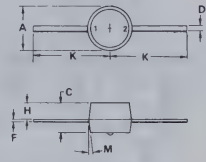
## CASE 171



STYLE 1:  
PIN 1. EMITTER  
2. COLLECTOR  
STYLE 2:  
PIN 1. ANODE  
2. CATHODE

DIM	MIN	MAX	MIN	MAX
A	3.56	4.08	0.140	0.160
C	4.57	5.33	0.180	0.210
D	0.33	0.48	0.013	0.019
F	0.23	0.28	0.009	0.011
H	1.92	1.27	0.040	0.050
K	6.35	—	0.250	—
Q	1.91	NOM	0.075	NOM

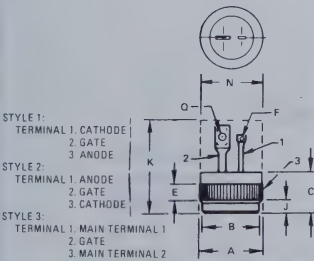
## CASE 173



PIN 1. EMITTER  
2. COLLECTOR

DIM	MIN	MAX	MIN	MAX
A	1.98	2.34	0.078	0.092
C	1.22	1.47	0.048	0.058
D	0.25	0.41	0.010	0.016
F	0.10	0.15	0.004	0.006
H	0.51	0.76	0.020	0.030
K	4.06	—	0.160	—
M	2.5	7.0	0.1	0.25

## CASE 174-02 TO-203

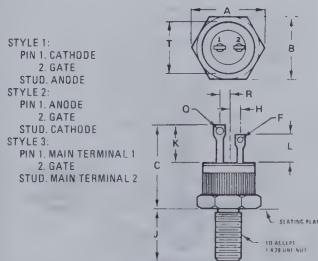


STYLE 1:  
TERMINAL 1. CATHODE  
2. GATE  
3. ANODE  
STYLE 2:  
TERMINAL 1. ANODE  
2. GATE  
3. CATHODE  
STYLE 3:  
TERMINAL 1. MAIN TERMINAL 1  
2. GATE  
3. MAIN TERMINAL 2

DIM	MIN	MAX	MIN	MAX
A	12.726	12.827	0.501	0.505
B	11.811	12.065	0.465	0.475
C	8.39	9.65	0.330	0.380
E	2.54	—	0.100	—
F	0.89	1.72	0.035	0.068
J	2.04	2.46	0.080	0.097
K	—	20.32	—	0.800
N	—	12.95	—	0.510
Q	1.65	2.28	0.065	0.090

All JEDEC dimensions and notes apply

## CASE 175



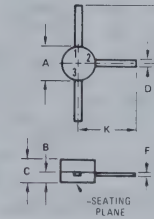
STYLE 1:  
PIN 1. CATHODE  
2. GATE  
STUD. ANODE  
STYLE 2:  
PIN 1. ANODE  
2. GATE  
STUD. CATHODE  
STYLE 3:  
PIN 1. MAIN TERMINAL 1  
2. GATE  
STUD. MAIN TERMINAL 2

DIM	MIN	MAX	MIN	MAX
A	15.34	15.60	0.604	0.614
B	14.00	14.20	0.551	0.559
C	20.70	24.13	0.815	0.950
F	1.40	1.65	0.055	0.065
H	2.29	REF	0.090	REF
J	10.67	11.55	0.420	0.455
K	9.78	10.54	0.385	0.415
L	8.99	7.75	0.275	0.305
Q	2.03	2.41	0.080	0.095
R	1.65	REF	0.065	REF
T	12.70	12.83	0.500	0.505

Dimensions are in  
inches unless  
otherwise noted



## CASE 176



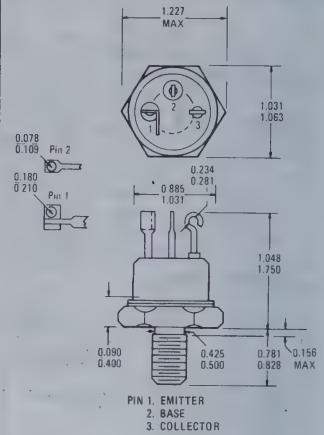
DIM	MIN	MAX	MIN	MAX
A	2.03	2.57	0.080	0.105
B	0.51	0.76	0.020	0.030
C	1.27	2.03	0.050	0.080
D	0.25	0.41	0.010	0.016
E	0.08	0.15	0.003	0.006
K	4.06	4.57	0.160	0.180

NOTE  
A Tolerance of 25 mm (1 010) must be allowed at point leads protrude from package for plug run over.

## CASE 176 STYLES

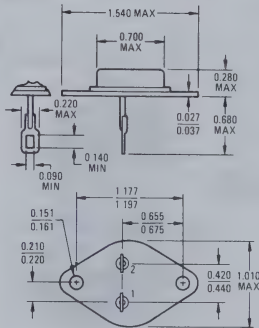
- STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR
- STYLE 2:  
PIN 1. SOURCE  
2. GATE  
3. DRAIN
- STYLE 3:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE
- STYLE 4:  
PIN 1. ANODE 2  
2. ANODE 1  
3. CATHODE
- STYLE 5:  
PIN 1. CATHODE  
2. NOT CONNECTED  
3. ANODE
- STYLE 6:  
PIN 1. CATHODE  
2. ANODE  
3. ANODE

## CASE 177 TO-114



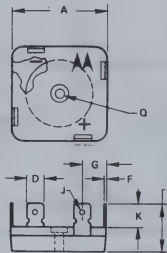
All JEDEC dimensions and notes apply

## CASE 178



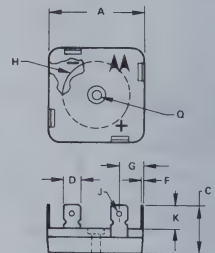
- STYLE 1:  
PIN 1. GATE  
2. CATHODE  
CASE. ANODE
- STYLE 2:  
PIN 1. GATE  
2. MAIN TERMINAL 1  
CASE. MAIN TERMINAL 2

## CASE 179-01



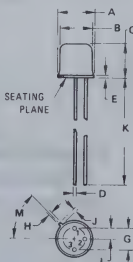
DIM	MIN	MAX	MIN	MAX
A	31.37	31.88	1.235	1.255
B	16.76	19.30	0.660	0.760
C	6.22	6.48	0.245	0.255
D	0.74	0.86	0.029	0.034
E	8.64	10.16	0.340	0.400
F	2.16	2.54	0.085	0.100
G	7.49	9.53	0.295	0.375
H	3.58	3.94	0.140	0.155

## CASE 179-02



DIM	MIN	MAX	MIN	MAX
A	31.37	31.88	1.235	1.255
B	16.76	19.30	0.660	0.760
C	6.22	6.48	0.245	0.255
D	0.74	0.86	0.029	0.034
E	8.64	10.16	0.340	0.400
F	2.16	2.54	0.085	0.100
G	7.49	9.53	0.295	0.375
H	3.58	3.94	0.140	0.155

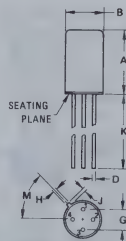
## CASE 180



- STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

DIM	MIN	MAX	MIN	MAX
A	8.51	9.40	0.335	0.370
B	7.87	8.64	0.310	0.340
C	6.10	6.91	0.240	0.270
D	0.56	0.71	0.022	0.028
E	0.23	0.38	0.009	0.015
F	5.08 BSC	5.70 BSC		
G	0.84	0.89	0.035	0.035
H	0.74	0.74	0.029	0.045
I	38.10	1.500		
J	2.54 BSC	0.100 BSC		
K	45.0 BSC	45.0 BSC		

## CASE 181-02



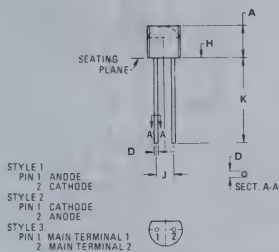
- STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR  
4. ZENER

DIM	MIN	MAX	MIN	MAX
A	17.02	—	0.670	—
B	9.14	9.78	0.360	0.385
C	0.41	0.48	0.016	0.019
D	4.83	5.33	0.190	0.210
E	0.71	0.86	0.028	0.034
F	0.51	—	0.020	—
G	38.10	1.500		
H	42.0	48.0	42.0	48.0

Dimensions are in inches unless otherwise noted

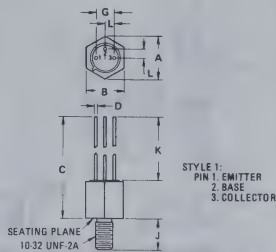


## CASE 182-03



DIM	MIN	MAX	MIN	MAX
A	4.45	4.70	0.175	0.185
B	0.41	0.48	0.016	0.019
J	2.29	2.79	0.090	0.110
K	12.70	-	0.500	-

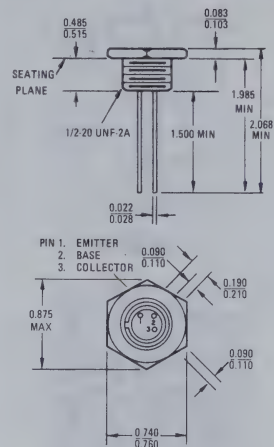
## CASE 183



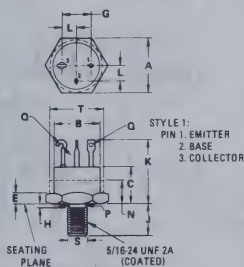
DIM	MIN	MAX	MIN	MAX
A	12.45	12.95	0.490	0.510
B	10.85	11.35	0.427	0.447
C	40.35	-	1.583	-
D	0.56	0.71	0.022	0.028
G	4.83	5.33	0.190	0.210
J	8.76	9.27	0.345	0.365
K	38.10	-	1.500	-
L	2.41	2.67	0.095	0.105

NOTE:  
1. COLLECTOR CONNECTED TO CASE

## CASE 184



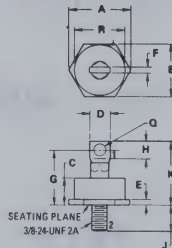
## CASE 188 TO-63



DIM	MIN	MAX	MIN	MAX
A	21.72	22.23	0.855	0.875
B	18.82	19.63	0.745	0.775
C	12.19	13.59	0.480	0.535
E	2.29	4.24	0.090	0.167
G	12.32	13.08	0.485	0.515
H	2.67	-	0.105	-
J	11.68	12.57	0.460	0.495
K	23.80	26.16	0.937	1.030
L	6.10	6.60	0.240	0.260
N	-	7.62	-	0.300
P	7.06	7.92	0.278	0.312
Q	1.52	2.67	0.060	0.105
S	7.127	7.249	0.2806	0.2854
T	19.69	22.23	0.775	0.875

All JEDEC notes and dimensions apply.

## CASE 189

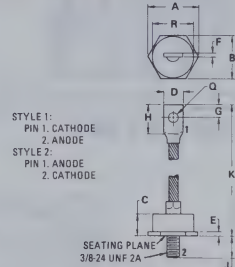


DIM	MIN	MAX	MIN	MAX
A	33.02	36.83	1.300	1.450
B	31.37	32.13	1.235	1.265
C	13.72	17.91	0.540	0.705
D	12.70	13.34	0.500	0.525
E	2.92	3.43	0.115	0.135
F	2.67	3.43	0.105	0.135
G	28.21	34.29	1.150	1.350
H	12.70	16.76	0.500	0.660
J	15.06	16.69	0.593	0.657
K	34.93	44.45	1.375	1.750
Q	6.10	6.60	0.240	0.260
R	-	30.48	-	1.200

STYLE 1:  
PIN 1. CATHODE  
2. ANODE

STYLE 2:  
PIN 1. ANODE  
2. CATHODE

## CASE 190-01

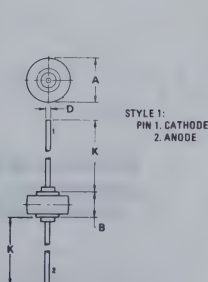


DIM	MIN	MAX	MIN	MAX
A	-	36.83	-	1.450
B	31.37	32.13	1.235	1.265
C	13.72	17.91	0.540	0.705
D	12.00	15.54	0.517	0.617
E	2.82	3.43	0.115	0.135
F	1.52	3.30	0.060	0.130
G	8.71	10.34	0.343	0.407
H	19.05	22.86	0.750	0.900
J	15.06	16.69	0.593	0.657
K	127.00	139.70	5.000	5.500
Q	6.76	7.92	0.266	0.312
R	-	30.48	-	1.200

STYLE 1:  
PIN 1. CATHODE  
2. ANODE

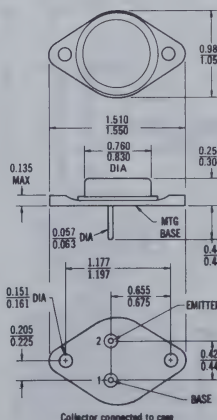
STYLE 2:  
PIN 1. ANODE  
2. CATHODE

## CASE 194

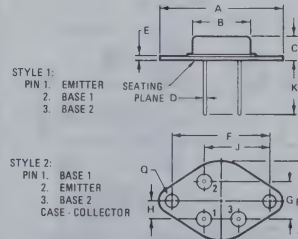


DIM	MIN	MAX	MIN	MAX
A	10.03	10.29	0.395	0.405
B	5.94	6.25	0.234	0.246
D	1.27	1.35	0.050	0.053
K	25.15	25.65	0.990	1.010

## CASE 197



## CASE 198

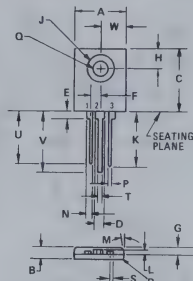


DIM	MIN	MAX	MIN	MAX
A	-	31.80	-	1.252
B	11.94	12.70	0.470	0.500
C	6.35	8.64	0.250	0.340
D	0.71	0.86	0.028	0.034
E	1.27	1.91	0.050	0.075
F	24.33	24.43	0.958	0.962
G	4.83	5.33	0.190	0.210
H	7.41	2.67	0.095	0.105
J	14.48	14.98	0.570	0.590
K	9.14	10.16	0.360	0.400
Q	3.61	3.86	0.142	0.152
R	-	18.16	-	0.715

Collector connected to case



## CASE 199-03

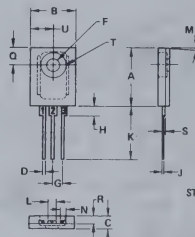


1 DIM "F" IS TO CENTERLINE OF LEADS.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.495	0.505	12.57	12.73
B	0.125	0.135	3.18	3.43
C	0.633	0.643	16.08	16.33
D	0.085	0.095	2.16	2.41
E	0.105	0.115	2.67	2.92
F	0.100 TP		2.54 TP	
G	0.075	0.085	1.91	2.16
H	0.188	0.198	4.78	5.03
J	0.275	0.285	6.99	7.24
K	0.580	0.590	14.73	14.99
L	0.032	0.034	0.813	0.864
M	30 TYP		30 TYP	
N	0.058	0.068	1.47	1.73
P	0.020	0.030	0.508	0.762
Q	0.142	0.152	3.61	3.86
R	0.020 TYP		0.508 TYP	
S	0.017	0.027	0.432	0.686
T	0.041	0.051	1.04	1.30
U	0.550	0.560	13.97	14.22
V	0.600	0.630	15.24	16.00
W	0.245	0.255	6.220	6.48

(See page 8-38 for lead form availability.)

## CASE 199-04

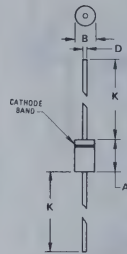


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.08	16.33	0.633	0.643
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	0.51	0.76	0.020	0.030
E	3.61	3.86	0.142	0.152
G	2.54 BSC		0.100 BSC	
H	2.67	2.92	0.105	0.115
J	0.43	0.69	0.017	0.027
K	14.73	14.99	0.580	0.590
L	2.16	2.41	0.085	0.095
M	30 TYP		30 TYP	
N	1.47	1.73	0.058	0.068
O	4.78	5.03	0.188	0.198
R	1.91	2.16	0.075	0.085
S	0.81	0.86	0.032	0.034
T	6.99	7.24	0.275	0.285
U	6.22	6.48	0.245	0.255

NOTES:  
1. DIM "G" IS TO CENTER OF LEADS

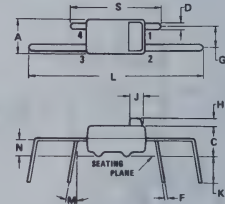
(See page 8-38 for lead form availability.)

## CASE 205



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.54	3.81	0.100	0.150
B	2.34	2.64	0.092	0.104
D	0.48	0.53	0.019	0.021
K	27.51	—	1.083	—

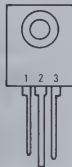
## CASE 206A



D/M	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.30	3.81	0.130	0.150
C	3.43	3.94	0.135	0.155
D	0.64	0.89	0.025	0.035
F	0.20	0.30	0.008	0.012
G	1.88	2.18	0.074	0.086
H	0.64	0.89	0.025	0.035
J	1.50	1.75	0.059	0.069
K	2.92	3.18	0.115	0.125
L	15.75	16.76	0.620	0.660
M		10°		10°
N	1.78	2.03	0.070	0.080
S	8.64	9.65	0.340	0.380

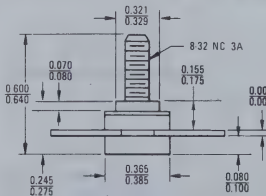
PIN 1. GROUND

## CASE 199 STYLES

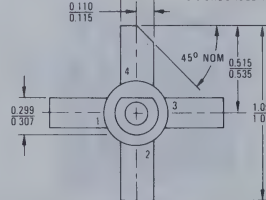


- STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER
- STYLE 2:  
PIN 1. CATHODE  
2. ANODE  
3. GATE
- STYLE 3:  
PIN 1. ANODE 1  
2. ANODE 2  
3. GATE
- PIN 1. EMITTER  
2. BASE  
3. COLLECTOR
- PIN 1. ANODE B  
2. ANODE A  
3. ANODE G  
4. ANODE F  
5. DECIMAL POINT ANODE  
6. ANODE C  
7. ANODE D  
8. ANODE E  
9. COMMON CATHODE

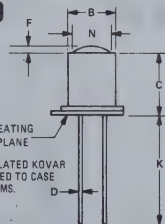
## CASE 208



- STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. EMITTER  
4. COLLECTOR
- STYLE 2:  
PIN 1. EMITTER  
2. BASE  
3. EMITTER  
4. COLLECTOR  
1 & 3 GROUNDED TO STUD



## CASE 209



NOTES:  
1. LEADS ARE GOLD PLATED KOVAR  
2. CATHODE CONNECTED TO CASE  
3. PKG. WT. ~ 0.45 GRAMS.

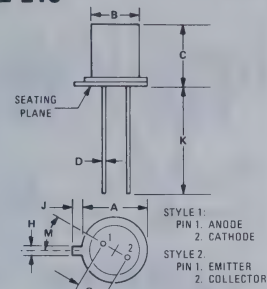
PIN 1. ANODE  
PIN 2. CATHODE

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.209	0.230	5.31	5.84
B	0.178	0.195	4.52	4.95
C	0.180	0.210	4.57	5.33
D	0.016	0.019	0.406	0.483
F	0.020	0.040	0.508	1.02
G	0.100 TP		2.54 TP	
H	0.039	0.046	0.991	1.17
J	0.033	0.048	0.838	1.22
K	0.500		12.7	
M	45°		45°	
N	0.132	0.158	3.35	4.01

Dimensions are in inches unless otherwise noted



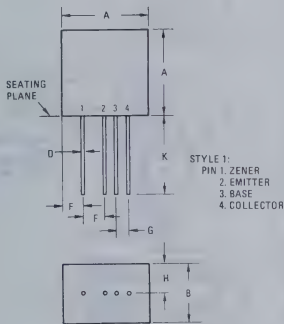
## CASE 210



- NOTES:  
1. LEADS ARE GOLD PLATED KQVAR  
2. CATHODE CONNECTED TO CASE  
3. PKG. WT.  $\approx$  0.45 GRAMS

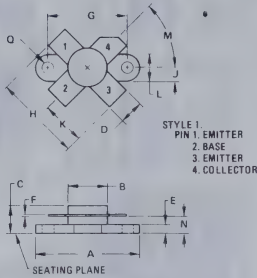
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.208	0.230	5.31	5.84
B	0.178	0.195	4.52	4.95
C	0.180	0.210	4.57	5.33
D	0.016	0.019	0.406	0.483
G	0.100 TP		2.54 TP	
H	0.039	0.046	0.991	1.17
J	0.033	0.048	0.838	1.22
K	0.500		12.7	
M	45°		45°	

## CASE 212



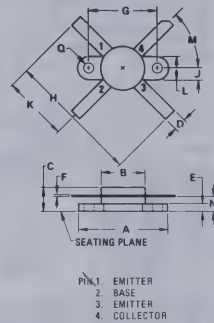
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.65	10.41	0.380	0.410
B	7.62	8.13	0.300	0.320
D	0.48	0.56	0.018	0.022
F	2.29	2.78	0.090	0.110
G	1.02	1.52	0.040	0.060
H	3.68	4.19	0.145	0.165
K	9.53		0.375	

## CASE 211-01



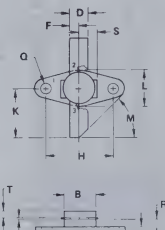
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.64	24.89	0.970	0.980
B	9.47	9.73	0.373	0.383
C	6.07	7.14	0.239	0.281
D	5.59	5.84	0.220	0.230
E	2.16	2.67	0.085	0.105
F	0.10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	21.59	22.10	0.850	0.870
J	3.12	3.23	0.123	0.127
K	10.80	11.05	0.425	0.435
L	6.22	6.48	0.245	0.255
M	40°	50°	40°	50°
N	3.81	4.57	0.150	0.180
Q	2.97	3.12	0.117	0.123

## CASE 211-02



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.64	24.89	0.970	0.980
B	11.81	12.07	0.465	0.475
C	5.82	6.13	0.229	0.245
D	2.16	3.94	0.085	0.155
E	2.13	2.54	0.084	0.100
F	0.10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	35.56	38.10	1.400	1.500
J	3.12	3.23	0.123	0.127
K	17.78	19.05	0.700	0.750
L	6.22	6.48	0.245	0.255
M	40°	50°	40°	50°
N	3.66	4.32	0.144	0.170
Q	2.97	3.12	0.117	0.123

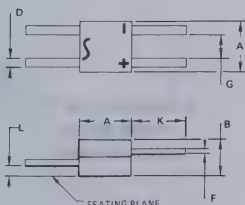
## CASE 215



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	21.08	21.59	0.830	0.850
B	9.27	9.78	0.365	0.385
D	5.59	5.84	0.220	0.230
E	2.03	2.41	0.080	0.095
F	2.79	2.92	0.110	0.115
H	15.11	15.37	0.595	0.605
J	0.10	0.15	0.004	0.006
K	13.08	13.59	0.515	0.535
L	9.91	10.41	0.390	0.410
M	45°	NOM	45°	NOM
Q	2.92	3.18	0.115	0.125
R	1.52	2.03	0.060	0.080
S	-	4.38	-	0.212
T	2.03	2.54	0.080	0.100

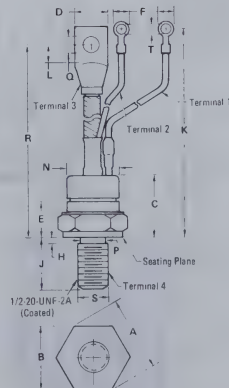
- STYLE 1  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER
- STYLE 2  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE

## CASE 216



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.10	6.73	0.240	0.265
B	4.06	4.70	0.160	0.185
D	0.89	1.27	0.035	0.050
F	0.46	0.76	0.018	0.030
G	2.84	NOM	0.112	NOM
K	6.60	7.11	0.260	0.280
L	1.27	1.78	0.050	0.070

## CASE 219 TO-94



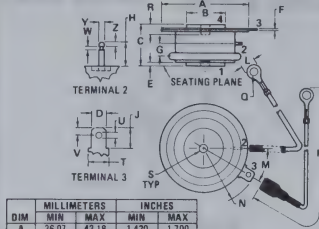
- STYLE 1:  
TERMINAL 1. GATE  
2. CATHODE  
3. CATHODE  
4. ANODE

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	31.16	-	1.227
B	26.19	27.09	1.031	1.063
C	-	63.50	-	2.500
D	11.10	16.50	0.437	0.650
E	4.40	12.70	0.170	0.500
F	5.46	7.62	0.215	0.300
H	-	3.17	-	0.125
J	20.25	21.00	0.797	0.827
K	174.0	190.5	6.850	7.500
L	6.35	-	0.250	-
N	-	26.18	-	1.031
P	10.80	12.67	0.425	0.499
Q	6.61	7.67	0.260	0.310
R	146.7	159.1	5.775	6.265
S	11.733	11.874	0.4619	0.4675
T	3.56	3.81	0.140	0.150

All JEDEC dimensions and notes apply



## CASE 220-01

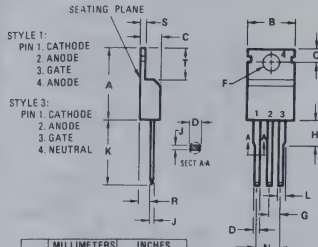


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	35.07	43.18	1.420	1.700
B	18.54	28.59	0.730	1.105
C	12.45	15.24	0.490	0.600
D	4.72	4.85	0.186	0.191
E	0.25	2.54	0.010	0.100
F	0.35	0.48	0.014	0.019
G	7.62	—	0.300	—
H	3.54	—	0.150	—
J	6.22	19.30	0.245	0.760
K	207.63	206.12	7.980	8.115
L	—	7.62	—	0.300
M	390	500	209	500
N	15.48	28.58	0.610	1.125
Q	3.48	3.89	0.137	0.153
R	1.27	3.18	0.050	0.125
S	3.12	3.88	0.123	0.145
T	4.72	7.92	0.186	0.312
U	1.27	1.78	0.050	0.070
V	2.92	3.56	0.115	0.140
W	0.25	0.51	0.010	0.020
Y	1.45	1.50	0.057	0.059
Z	0.89	1.40	0.035	0.055

STYLE 1:  
1. ANODE  
2. GATE  
3. CATHODE  
4. CATHODE

NOTES:  
1. PACKAGE CONTOUR  
OPTIONAL BETWEEN  
TERM 1 & 2 and  
BETWEEN TERM 2 & 3  
WITHIN A. TERMINALS  
2 and 3 MUST BE LO-  
GATED TO MAKE THE  
OUTLINE NON-  
SYMMETRICAL.  
2. DIM "K" APPLIES TO  
BOTH LEADS.  
3. DIMENSIONS TO DIA.  
OF SURFACE 1 ALSO  
APPLIES TO SURFACE 4.

## CASE 221-02 TO-220AB



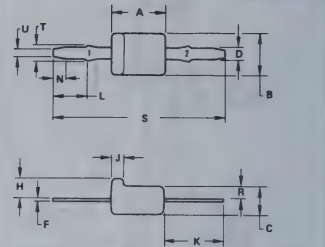
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.23	15.87	0.560	0.625
B	9.66	10.86	0.380	0.420
C	3.56	4.82	0.140	0.190
D	0.51	1.14	0.020	0.045
E	3.51	3.73	0.139	0.147
F	2.82	2.79	0.099	0.110
G	—	6.35	—	0.250
H	0.31	1.14	0.012	0.045
K	12.70	14.27	0.500	0.562
L	1.14	1.77	0.045	0.070
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.92	0.080	0.115
S	0.51	1.39	0.020	0.055
T	5.85	6.85	0.230	0.270

STYLE 2:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. MAIN TERMINAL 2

STYLE 4:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. NEUTRAL

All JEDEC dimensions and notes apply

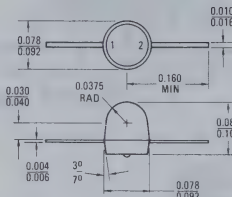
## CASE 226



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.86	4.11	0.152	0.162
B	2.92	3.18	0.115	0.125
C	1.91	2.18	0.075	0.085
D	0.64	0.89	0.025	0.035
F	0.08	0.18	0.003	0.007
H	1.30	1.55	0.051	0.061
J	0.64	0.89	0.025	0.035
K	4.06	4.32	0.160	0.170
L	2.35	2.62	0.093	0.103
N	1.72	1.37	0.044	0.064
R	0.79	1.04	0.031	0.041
S	11.99	12.75	0.472	0.502
T	1.14	1.40	0.045	0.055
U	0.43	0.69	0.017	0.027

PIN 1. CATHODE  
2. ANODE

## CASE 234-01

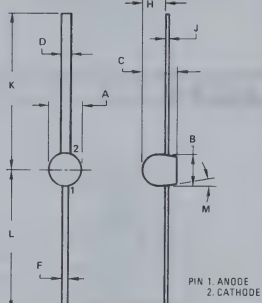


STYLE 1:  
PIN 1. EMITTER  
2. COLLECTOR

STYLE 2:  
PIN 1. ANODE  
2. CATHODE

Cathode indicated by larger bonding pad on bottom of device.

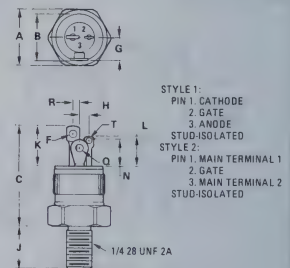
## CASE 234-02



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.34	2.59	0.092	0.102
B	2.11	2.36	0.083	0.093
C	2.39	2.64	0.094	0.104
D	0.66	0.71	0.026	0.028
F	0.48	0.53	0.019	0.021
H	1.57	1.83	0.062	0.073
J	0.20	0.30	0.008	0.012
K	11.30	11.43	0.445	0.450
L	10.29	10.41	0.405	0.410
M	9°	11°	9°	11°

PIN 1. ANODE  
2. CATHODE

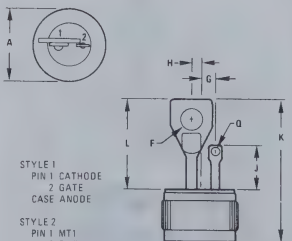
## CASE 235



STYLE 1:  
PIN 1. CATHODE  
2. GATE  
3. ANODE  
STUD-ISOLATED  
STYLE 2:  
PIN 1. MAIN TERMINAL 1  
2. GATE  
3. MAIN TERMINAL 2  
STUD-ISOLATED

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.00	14.20	0.551	0.559
B	12.73	12.83	0.501	0.505
C	—	26.16	—	1.030
F	2.93	2.41	0.080	0.095
G	—	6.48	—	0.255
H	2.16	2.41	0.085	0.095
J	10.67	11.56	0.420	0.455
K	9.78	10.54	0.385	0.415
L	6.99	7.75	0.275	0.305
N	6.48	6.99	0.255	0.275
O	3.43	3.81	0.135	0.150
R	1.52	1.78	0.060	0.070
T	1.40	1.65	0.055	0.065

## CASE 237-01



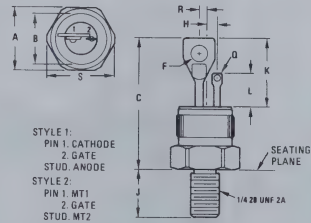
STYLE 1:  
PIN 1. CATHODE  
2. GATE  
CASE ANODE

STYLE 2:  
PIN 1. MT1  
2. GATE  
CASE MT2

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.73	12.83	0.501	0.505
F	—	4.06	—	0.160
G	2.16	2.41	0.085	0.095
H	1.52	1.78	0.060	0.070
J	6.99	7.75	0.275	0.305
K	—	26.67	—	1.050
L	—	17.02	—	0.670
Q	1.40	1.85	0.055	0.065

NOTE:  
1. DIM "G" & "H" TO BE MEASURED AT CAN.

## CASE 238-01



STYLE 1:  
PIN 1. CATHODE  
2. GATE  
STUD, ANODE

STYLE 2:  
PIN 1. MT1  
2. GATE  
STUD, MT2

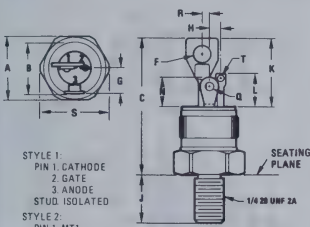
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.00	14.20	0.551	0.559
B	12.73	12.83	0.501	0.505
C	—	30.21	—	1.190
F	—	4.06	—	0.160
H	2.16	2.41	0.085	0.095
J	10.67	11.56	0.420	0.455
K	—	17.02	—	0.670
L	6.99	7.75	0.275	0.305
Q	1.40	1.85	0.055	0.065
R	1.52	1.78	0.060	0.070
S	15.34	15.60	0.604	0.614

NOTE:  
1. DIM "H" & "R" TO BE MEASURED AT CAN.

Dimensions are in inches unless otherwise noted



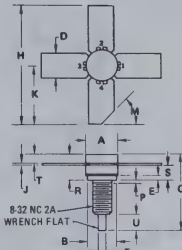
## CASE 239-01



DIM	MIN	MAX	MIN	MAX
A	14.00	14.20	0.551	0.558
B	12.73	12.83	0.501	0.505
C	-	32.51	-	1.280
F	-	4.06	-	0.160
G	-	6.48	-	0.253
H	2.16	2.41	0.085	0.095
J	10.67	11.58	0.420	0.455
K	-	17.02	-	0.670
L	6.99	7.75	0.275	0.305
N	6.48	6.99	0.255	0.275
Q	3.43	3.81	0.135	0.150
R	1.52	1.78	0.060	0.070
S	15.34	15.60	0.604	0.614
T	1.40	1.65	0.055	0.065

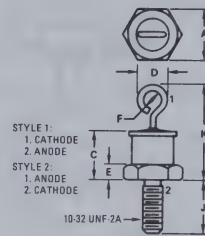
NOTE:  
1. DIM "G," "H" & "R" TO BE MEASURED AT CAN

## CASE 244



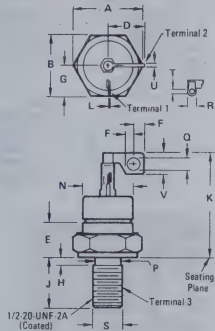
DIM	MIN	MAX	MIN	MAX
A	7.06	7.26	0.278	0.286
B	6.25	6.45	0.246	0.254
C	15.49	16.51	0.610	0.650
D	5.59	5.84	0.220	0.230
E	1.52	NOM	0.060	NOM
H	26.80	27.05	1.055	1.065
J	0.122	NOM	0.005	NOM
K	13.41	13.51	0.528	0.532
M	45°	NOM	45°	NOM
P	1.27	-	0.050	-
R	4.52	5.03	0.178	0.198
S	3.00	3.25	0.118	0.128
T	1.40	1.65	0.055	0.065
U	2.92	3.68	0.115	0.145

## CASE 245



DIM	MIN	MAX	MIN	MAX
A	10.77	11.10	0.424	0.437
C	-	10.29	-	0.405
D	-	6.35	-	0.250
E	1.91	4.45	0.075	0.175
F	1.52	-	0.060	-
J	10.72	11.51	0.422	0.453
K	-	20.32	-	0.800

## CASE 246 T0-83

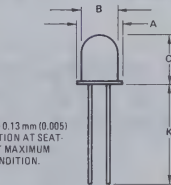


STYLE 1  
TERMINAL 1. GATE  
2. CATHODE  
3. ANODE

DIM	MIN	MAX	MIN	MAX
A	-	31.16	-	1.227
B	26.19	27.00	1.031	1.063
D	-	16.51	-	0.650
E	4.4	12.70	0.170	0.500
F	4.58	-	0.180	-
G	-	14.60	-	0.575
H	-	3.17	-	0.125
J	20.25	21.00	0.797	0.827
K	-	45.97	-	1.810
L	0.31	1.27	0.012	0.050
N	-	26.18	-	1.031
P	10.80	12.67	0.425	0.499
Q	4.58	6.60	0.180	0.260
R	2.93	4.06	0.115	0.160
S	11.733	11.841	0.4619	0.4675
T	1.53	2.03	0.060	0.080
U	1.53	2.92	0.060	0.115
V	9.2	11.9	0.360	0.470

All JEDEC dimensions and notes apply

## CASE 247

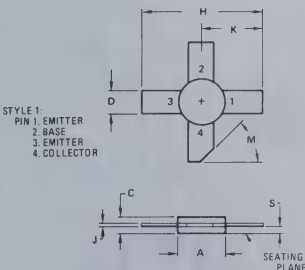


NOTE:  
1. LEADS WITHIN 0.13 mm (0.005)  
OF TRUE POSITION AT SEAT-  
ING PLANE, AT MAXIMUM  
MATERIAL CONDITION.

STYLE 1  
PIN 1. ANODE  
PIN 2. CATHODE

DIM	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.70	5.33	0.185	0.210
C	5.08	5.72	0.200	0.225
D	0.41	0.48	0.016	0.019
G	2.54	BSC	0.100	BSC
H	0.91	1.17	0.035	0.046
J	0.71	1.22	0.028	0.048
K	12.70	-	0.500	-
M	45°	BSC	45°	BSC

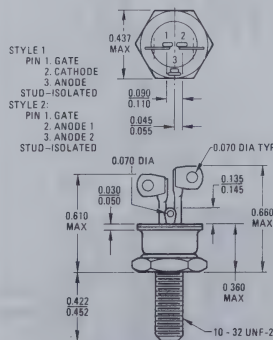
## CASE 249



STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. EMITTER  
4. COLLECTOR

DIM	MIN	MAX	MIN	MAX
A	7.06	7.26	0.278	0.286
C	2.92	3.35	0.115	0.132
D	5.59	5.84	0.220	0.230
H	26.67	27.18	1.050	1.070
J	0.10	0.15	0.004	0.006
K	13.34	13.59	0.525	0.535
M	40°	50°	40°	50°
S	1.40	1.65	0.055	0.065

## CASE 250

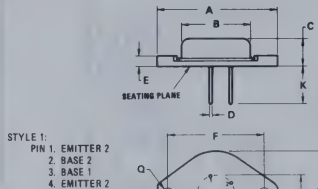


STYLE 1  
PIN 1. GATE  
2. CATHODE  
3. ANODE  
STUD-ISOLATED  
STYLE 2:  
PIN 1. GATE  
2. ANODE 1  
3. ANODE 2  
STUD-ISOLATED

Dimensions are in  
inches unless  
otherwise noted



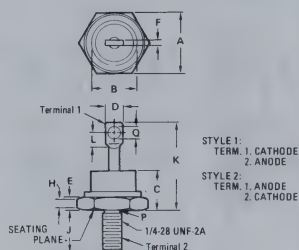
## CASE 253



DIM	MIN	MAX	MIN	MAX
A	—	38.61	—	1.520
B	—	21.08	—	0.830
C	6.35	8.13	0.250	0.320
D	0.97	1.09	0.038	0.043
E	—	2.43	—	0.136
F	29.90	30.40	1.177	1.197
G	11.94	RSC	0.470	BSC
H	7.11	8.13	0.280	0.320
I	72°	RSC	72°	BSC
J	18°	RSC	18°	BSC
K	3.64	4.09	0.151	0.161
L	—	26.67	—	1.050

NOTE  
1. LEADS WITHIN 0.13 mm (0.005) DIA OF  
TRUE POSITION AT SEATING PLANE AT  
MAXIMUM MATERIAL CONDITION

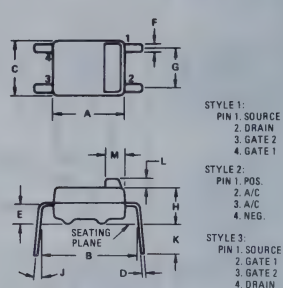
## CASE 257 DO-5



DIM	MIN	MAX	MIN	MAX
A	16.94	17.45	0.667	0.687
B	—	16.94	—	0.667
C	—	11.43	—	0.450
D	—	9.53	—	0.375
E	2.92	5.08	0.115	0.200
F	—	2.03	—	0.080
G	1.52	—	0.060	—
H	10.72	11.51	0.422	0.453
I	—	25.40	—	1.000
J	3.66	—	0.152	—
K	3.59	6.32	0.220	0.249
L	3.58	4.46	0.140	0.175

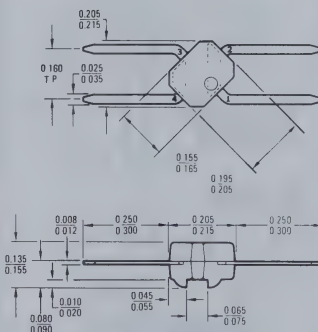
NOTES  
1. Dimension "P" is diameter.  
2. All JEDEC dimensions and notes apply.

## CASE 259-01

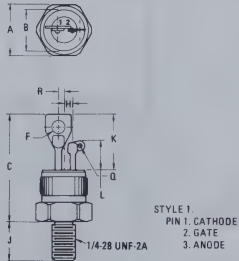


DIM	MIN	MAX	MIN	MAX
A	0.260	0.280	6.68	7.11
B	0.360	TP	9.14	TP
C	0.200	0.220	5.08	5.59
D	0.008	0.012	0.203	0.305
E	0.045	0.055	1.14	1.40
F	0.025	0.035	0.635	0.889
G	0.170	TP	4.32	TP
H	0.195	0.160	3.43	4.06
I	—	—	—	1.09
J	0.100	0.140	2.54	3.58
K	0.025	0.035	0.635	0.889
L	0.059	0.069	1.50	1.75

## CASE 262

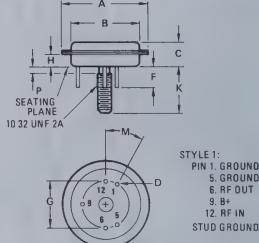


## CASE 263



DIM	MIN	MAX	MIN	MAX
A	14.90	14.70	0.551	0.559
B	12.73	12.83	0.501	0.505
C	28.96	30.23	1.140	1.190
F	3.43	4.06	0.135	0.160
W	2.28	REF	0.090	REF
J	10.67	11.56	0.420	0.455
K	15.75	17.02	0.620	0.670
L	7.62	8.89	0.300	0.350
Q	1.40	1.65	0.055	0.065
R	1.65	REF	0.065	REF

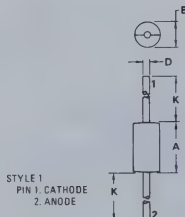
## CASE 264



DIM	MIN	MAX	MIN	MAX
A	29.21	31.75	1.150	1.250
B	24.64	25.65	0.970	1.010
C	8.26	8.76	0.325	0.345
D	0.71	0.81	0.028	0.032
F	4.06	5.08	0.160	0.200
G	19.05	BSC	0.750	BSC
H	4.32	4.83	0.170	0.190
K	10.57	11.94	0.430	0.470
N	30°	BSC	30°	BSC
P	—	2.79	—	0.110

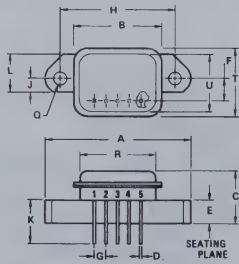
NOTE  
1. DIM "M" ALSO APPLIES BETWEEN  
LEADS 5 / 6.

## CASE 267



DIM	MIN	MAX	MIN	MAX
A	9.40	9.65	0.370	0.380
B	4.83	5.33	0.190	0.210
D	1.22	1.32	0.048	0.052
K	26.97	27.23	1.062	1.072

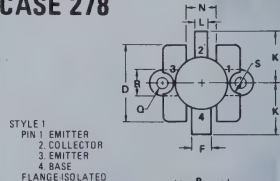
## CASE 270-01



DIM	MIN	MAX	MIN	MAX
A	46.99	48.01	1.850	1.890
B	25.45	30.48	1.160	1.200
C	14.25	15.11	0.565	0.595
D	0.69	0.84	0.027	0.033
E	4.95	5.46	0.195	0.215
F	7.62	7.87	0.300	0.310
G	4.06	BSC	0.160	BSC
H	37.97	38.23	1.495	1.505
J	4.57	4.83	0.180	0.190
K	9.14	10.15	0.360	0.400
L	12.57	12.83	0.495	0.505
Q	3.99	4.24	0.157	0.167
R	24.94	25.19	0.982	0.992
T	23.11	24.13	0.910	0.950
U	18.47	18.72	0.727	0.737

STYLE 1:  
PIN 1. RF IN  
2. DC & RF GROUND  
3. B+ INPUT  
4. DC & RF GROUND  
5. RF OUT

## CASE 278

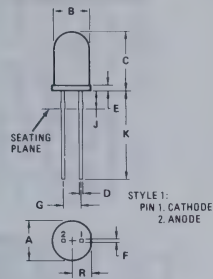


DIM	MIN	MAX	MIN	MAX
A	24.51	25.15	0.965	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	18.29	19.30	0.720	0.760
E	2.16	2.67	0.085	0.105
F	4.32	4.57	0.170	0.180
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	12.19	12.70	0.480	0.500
L	3.05	3.30	0.120	0.130
N	6.68	7.11	0.270	0.280
Q	2.79	3.18	0.110	0.125
R	6.10	6.60	0.240	0.260
S	2.87	3.05	0.105	0.120
U	1.86	1.91	0.065	0.075

NOTE  
DIMENSION "Q" IS DIA, DIMENSION "S" IS RAD

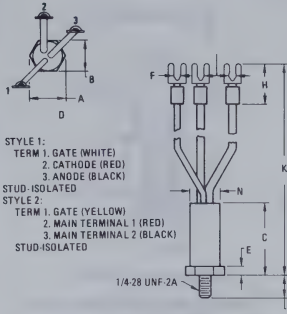


## CASE 279-01



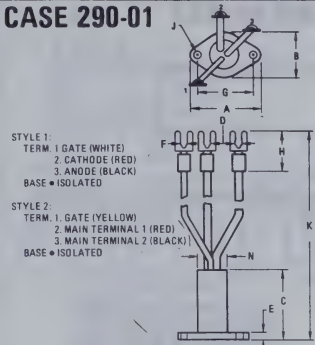
DIM	MIN	MAX	MIN	MAX
A	5.72	5.97	0.225	0.235
B	4.95	5.21	0.195	0.205
C	8.38	8.89	0.330	0.350
D	0.41	0.51	0.016	0.020
E	0.64	0.89	0.025	0.035
F	0.30	0.46	0.012	0.018
G	2.44	2.64	0.096	0.104
J	2.44	2.54	0.096	0.100
K	12.57	13.21	0.495	0.520
R	2.54	2.79	0.100	0.110

## CASE 289-01



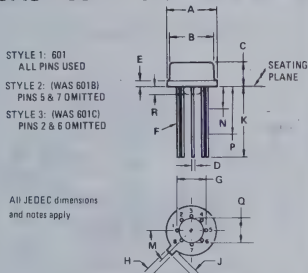
DIM	MIN	MAX	MIN	MAX
A	20.14	—	0.793	—
B	17.20	17.35	0.677	0.683
C	33.68	38.10	1.325	1.500
D	—	5.03	—	0.198
E	4.57	5.08	0.180	0.200
F	—	4.52	—	0.178
H	21.84	23.11	0.860	0.910
J	10.85	11.35	0.427	0.447
K	203.20	228.60	8.000	9.000
N	15.75	16.00	0.620	0.630

## CASE 290-01



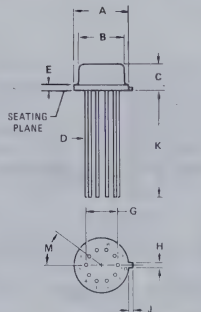
DIM	MIN	MAX	MIN	MAX
A	38.23	38.40	1.505	1.515
B	24.64	25.40	0.970	1.000
C	33.68	38.10	1.325	1.500
D	—	5.03	—	0.198
E	3.05	3.30	0.120	0.130
F	—	4.52	—	0.178
G	—	30.23	—	1.190
H	21.84	23.11	0.860	0.910
J	10.85	11.35	0.427	0.447
K	203.20	228.60	8.000	9.000
N	15.75	16.00	0.620	0.630

## CASE 601 TO-99



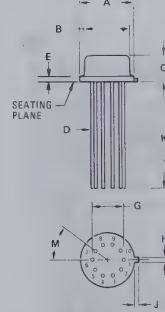
DIM	MIN	MAX	MIN	MAX
A	0.335	0.370	8.510	9.390
B	0.305	0.335	7.750	8.500
C	0.185	0.195	4.700	4.900
D	0.016	0.021	0.670	0.533
E	—	0.040	—	1.020
F	0.016	0.019	0.406	0.482
G	0.200	TP	5.080	TP
H	0.028	0.034	0.712	0.864
J	0.029	0.045	0.737	1.140
K	0.500	—	12.700	—
M	45° TYP	—	—	—
N	—	0.050	—	1.270
P	0.250	0.500	6.350	12.700
Q	0.140	0.160	3.540	4.060
R	0.010	0.040	0.254	1.010

## CASE 602A



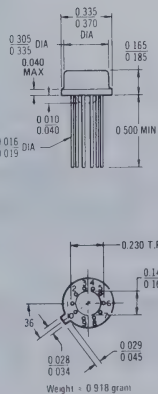
DIM	MIN	MAX	MIN	MAX
A	0.335	0.370	8.510	9.390
B	0.305	0.335	7.750	8.500
C	0.180	—	4.570	—
D	0.016	0.019	0.407	0.482
E	—	0.040	—	1.010
G	0.230	TP	5.940	TP
H	0.028	0.034	0.712	0.863
J	0.029	0.045	0.736	1.140
K	0.500	—	12.700	—
M	36° TYP	—	—	—

## CASE 602B

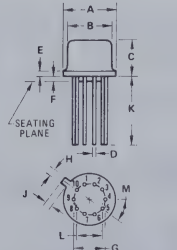


DIM	MIN	MAX	MIN	MAX
A	8.510	9.390	0.335	0.370
B	7.750	8.500	0.305	0.335
C	—	4.570	—	0.180
D	0.407	0.482	0.016	0.019
E	—	1.010	—	0.040
G	5.940	TP	0.230	TP
H	0.712	0.863	0.028	0.034
J	0.736	1.140	0.029	0.045
K	19.050	—	0.750	—
M	36° TYP	—	—	—

## CASE 603-02 TO-100

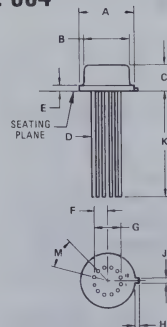


## CASE 603-03 TO-100



DIM	MIN	MAX	MIN	MAX
A	0.335	0.370	8.51	9.39
B	0.305	0.335	7.75	8.50
C	0.240	0.260	6.09	6.60
D	0.016	0.019	0.407	0.482
E	—	0.040	—	1.01
F	—	0.040	—	1.01
G	0.230	TP	5.94	TP
H	0.028	0.034	0.712	0.863
J	0.029	0.045	0.736	1.14
K	0.500	—	12.70	—
L	0.140	0.160	3.56	4.06
M	36° TYP	—	—	—

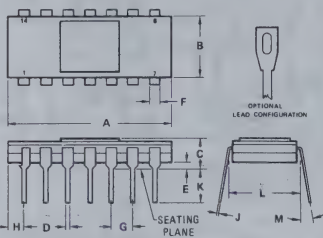
## CASE 604



DIM	MIN	MAX	MIN	MAX
A	0.335	0.370	8.510	9.400
B	0.305	0.335	7.750	8.510
C	—	0.180	—	4.570
D	0.016	0.019	0.406	0.483
E	—	0.040	—	1.020
F	0.080	0.110	2.280	2.750
G	0.190	0.210	4.820	5.330
H	0.029	0.045	0.736	1.140
J	0.028	0.034	0.712	0.864
K	0.750	—	19.050	—
M	30° TYP	—	—	—



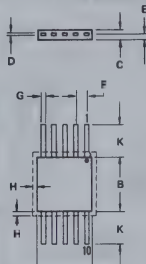
## CASE 605B-02



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.730	0.760	18.540	19.300
B	0.240	0.260	6.100	6.600
C	—	0.200	—	5.080
D	0.015	0.023	0.380	0.580
E	0.020	—	0.510	—
F	0.030	0.070	0.760	1.780
G	0.100	BSC	2.540	BSC
H	0.075	TYP	1.910	TYP
J	0.008	0.015	0.200	0.380
K	0.115	0.135	2.920	3.430
L	0.290	0.310	7.370	7.870
M	—	15°	—	15°

NOTE:  
DIMENSION "L" IS TO LEAD CENTERLINE  
WHEN FORMED PARALLEL.

## CASE 606 TO-91

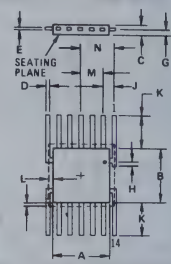


All JEDEC dimensions and notes apply

NOTE:  
1. LEAD "1" IS IDENTIFIED BY A TAB ON THAT LEAD.

DIM	INCHES		MILLIMETERS	
	MIN.	MAX	MIN	MAX
A	0.240	0.290	6.100	7.360
B	0.240	0.260	6.100	6.600
C	0.030	0.070	0.762	1.770
D	0.003	0.006	0.077	0.152
E	0.005	0.035	0.127	0.889
F	0.045	0.055	1.150	1.390
G	0.010	0.019	0.254	0.482
H	—	0.015	—	0.381
K	0.070	—	1.780	—

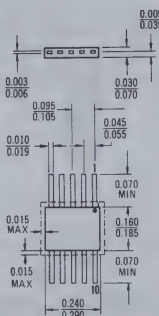
## CASE 607 TO-86



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.240	0.275	6.100	6.980
B	0.240	0.260	6.100	6.600
C	0.030	0.070	0.762	1.770
D	0.010	0.019	0.254	0.482
E	0.003	0.006	0.077	0.152
G	0.005	0.035	0.127	0.889
H	-	0.015	-	0.381
J	0.050 TP		1.270 TP	
K	0.070	-	1.770	-
L	-	0.015	-	0.381
M	0.100 TP		2.540 TP	
N	0.150 TP		3.810 TP	

NOTE  
LEAD #1 IDENTIFIED BY A TAB DIM "H"  
All JEDEC dimensions and notes apply.

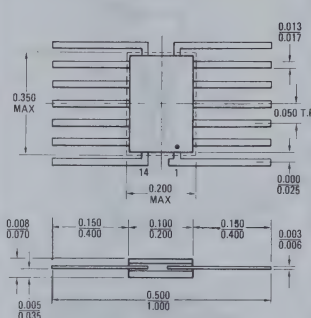
## CASE 608 TO-90



Lead 1 identified by color dot or by shoulder on lead.

All JEDEC dimensions and notes apply

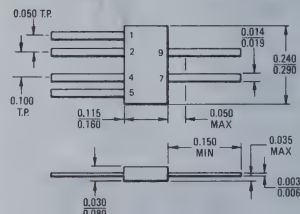
## CASE 609 TO-85



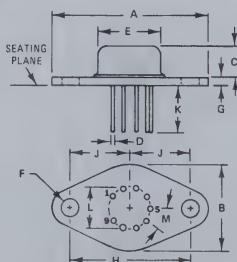
Lead 1 identified by color dot or by elbow on lead.

All JEDEC dimensions and notes apply

## CASE 610A-03

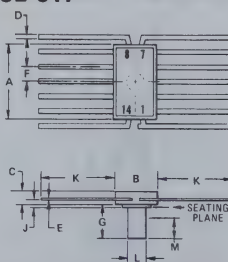


## CASE 614



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	-	1.252	-	31.80
B	-	.700	-	17.78
C	.200	.265	5.08	6.73
D	.028	.032	.711	.813
E	.470	.500	11.94	12.70
F	.142	.152D	3.61	3.86
G	.050	.075	1.27	1.90
H	.958	.962	24.33	24.43
J	.477	.483	12.12	12.27
K	.360	-	.914	-
L	.325 TYP R	-	8.25 TYP	-
M	.360 TYP P	-	360 TYP	-

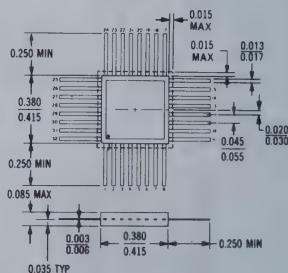
## CASE 617



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.240	0.285	6.100	6.730
B	0.160	0.185	4.060	4.700
C	0.045	0.070	1.140	1.910
D	0.011	0.017	0.279	0.432
E	0.003	0.006	0.076	0.152
F	0.050 TP		1.270 TP	
G	-	0.109	-	2.770
J	0.015	0.040	0.381	1.020
K	0.250	-	6.350	-
L	0.058	0.063	1.470	1.600
M	-	0.060	-	1.520

NOTES  
1. DIM "L" CONTROLLED & SOLDERABILITY  
DEFINED WITHIN DIM "M"  
2. LEAD 1 IDENTIFIED BY TAB ON THAT LEAD.

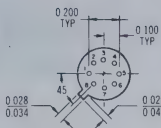
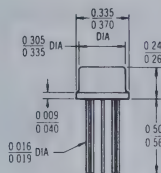
## CASE 618



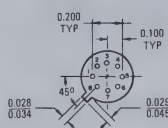
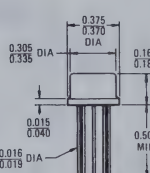
Lead 1 identified by elbow on lead or by color dot.



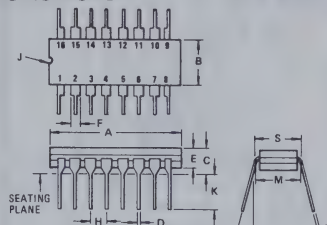
## CASE 619-01



## CASE 619-02



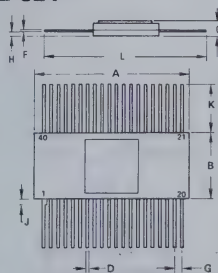
## CASE 620



- NOTES:  
1. DIM. "M" IS MEASURED AT CENTER OF LEADS WHEN FORMED PARALLEL.  
2. "J" INDEX NOTCH IN LEAD, INK DOT, OR NOTCH IN CERAMIC.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.740	0.780	18.790	19.810
B	0.240	0.275	6.100	6.990
C	0.170	0.200	4.320	5.080
D	0.015	0.020	0.381	0.508
E	0.125	0.165	3.430	4.190
F	0.055	0.065	1.400	1.650
H	0.100 TP		2.54 TP	
J	0.015	0.035	0.381	0.889
K	0.115	0.135	2.930	3.430
L	0°	15°	0°	15°
M	0.300 TP		7.620 TP	
N	0.008	0.012	0.203	0.305
S	-	0.325	-	8.260

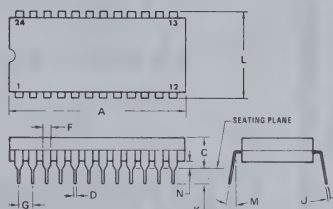
## CASE 621



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	25.40	26.41	1.000	1.040
B	10.16	10.67	0.400	0.420
C	1.52	2.54	0.060	0.100
D	0.33	0.43	0.013	0.017
F	0.10	0.15	0.004	0.006
G	1.27 BSC		0.050 BSC	
H	0.51	0.89	0.020	0.035
J	0.25	1.27	0.010	0.050
K	7.49	7.75	0.295	0.305
L	25.15	26.16	0.990	1.030

- NOTE:  
1. LEADS WITHIN 0.25 mm (0.010) TOTAL OF TRUE POSITION AT BODY, AT MAXIMUM MATERIAL CONDITION.

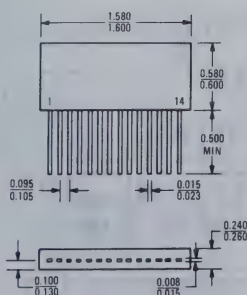
## CASE 623



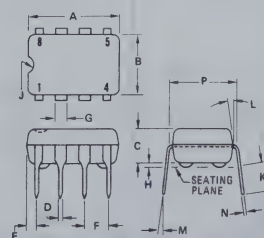
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	31.24	32.26	1.230	1.270
C	4.06	5.08	0.160	0.200
D	6.41	6.51	0.016	0.020
F	1.27	1.52	0.050	0.060
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	15.37 BSC		0.605 BSC	
M	5°	15°	5°	15°
N	0.51	0.76	0.020	0.030

- NOTES:  
1. DIM "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.  
2. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION, (WHEN FORMED PARALLEL).

## CASE 625



## CASE 626



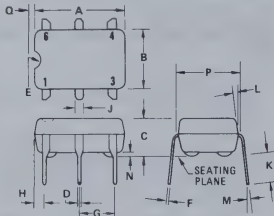
DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.370	0.390	9.39	9.90
B	0.240	0.260	6.09	6.35
C	0.135	0.155	3.43	3.94
D	0.015	0.019	0.381	0.483
E	-	0.045	-	1.14
F	0.100 TP		2.54 TP	
G	0.030	0.060	0.762	1.52
H	0.20 NOM		5.08 NOM	
J	0.330	0.400R	7.62	10.2R
K	0.115	0.135	2.92	3.43
L	7° TYP		7° TYP	
M	0°	10°	0°	10°
N	0.008	0.011	0.203	0.279
P	0.290	0.310	7.37	7.87

- NOTES:  
1. DIMENSION "P" IS TO LEAD CENTERLINE WHEN FORMED PARALLEL.  
2. FOUR (4) INSULATING STANDOFFS PROVIDED.

Dimensions are in inches unless otherwise noted



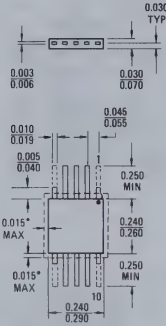
## CASE 627



DIM	MIN	MAX	MIN	MAX
A	.370	.390	9.40	9.91
B	.240	.250	6.10	6.35
C	.155	.175	3.93	4.44
D	.014	.018	.36	.46
E	.035 RAD		.89	RAD
F	.008	.012	.20	.30
G	.150 BSC		3.81	BSC
H		.045		1.14
J	.030	.060	.76	1.52
K	.115	.135	2.92	3.43
L		.70 TYP		.70 TYP
M		.100		.100
N	.015	.028	.38	.64
P	.290	.310	7.37	7.87
Q	.005	.015	.13	.38

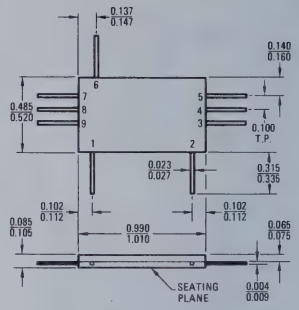
NOTES:  
1. DIMENSION "P" IS TO LEAD CENTERLINE WHEN FORMED PARALLEL.  
2. FOUR (4) INSULATING STANDOFFS ARE PROVIDED.

## CASE 628

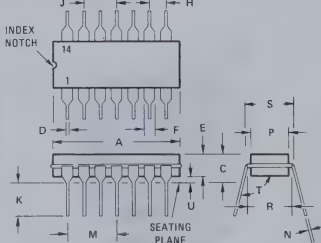


Lead 1 identified by color dot or by shoulder on lead.  
Leads 1, 5, 6, 10 are clipped.  
\*Tolerance for lid skewing, glass meniscus, and glass overrun.

## CASE 631



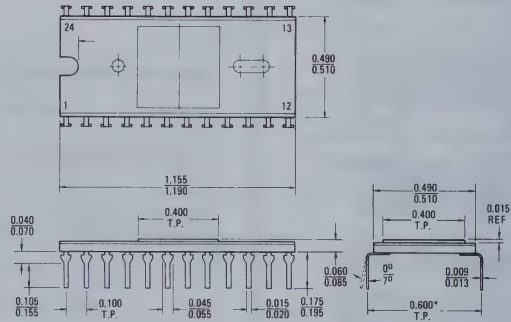
## CASE 632 TO-116



DIM	MIN	MAX	MIN	MAX
A	0.680	0.780	17.400	19.900
B		0.200		5.080
C	0.015	0.025	0.381	0.584
D	0.030	0.070	0.770	1.770
E	0.050	0.110	2.290	2.790
F	0.150	0.210	4.830	5.330
G	0.100		2.540	
H	0.290	0.310	7.370	7.870
I	0.008	0.015	0.203	0.381
J	0.220	0.280	5.590	7.110
K	0.230	0.310	7.370	7.870
L		0.325		8.260
M		90°		105°
N	0.020	0.030	0.508	0.762

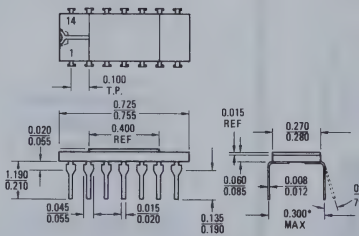
NOTE: 1. "R" - Installed Position of Lead Centers.  
2. "S" - Overall Installed Width.  
ALL JEDEC TO-116 dimensions and notes apply.

## CASE 635



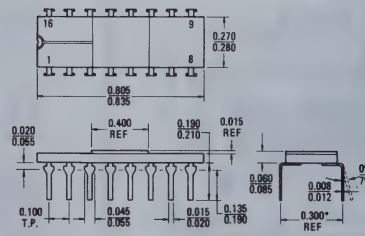
\*Dimension is to lead centerline when formed parallel.

## CASE 637



\*Dimension is to lead centerline when formed parallel.

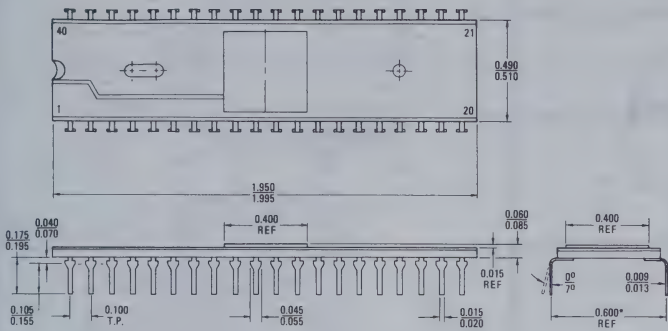
## CASE 638



\*Dimension is to lead centerline when formed parallel.

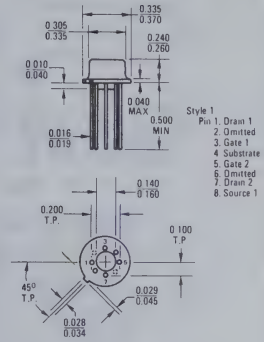


## CASE 639



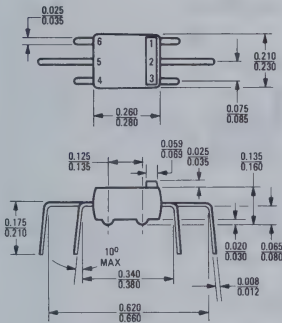
\*Dimension is to lead centerline when formed parallel.

## CASE 642 TO-76

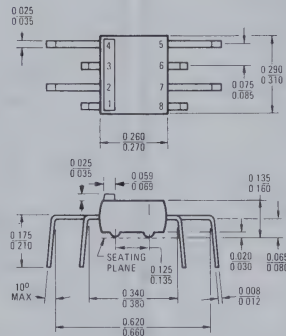


All JEDEC dimensions and notes apply

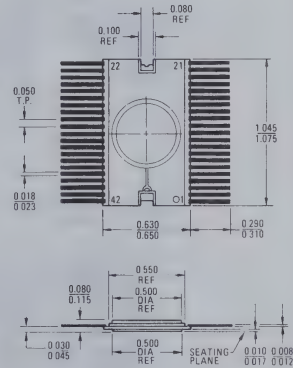
## CASE 643A



## CASE 644A

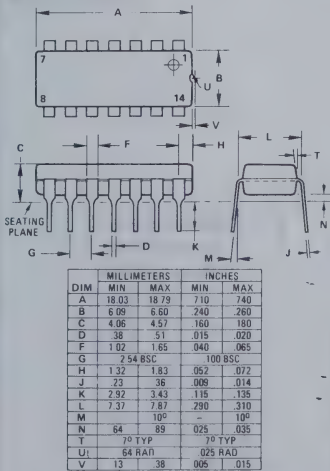


## CASE 645



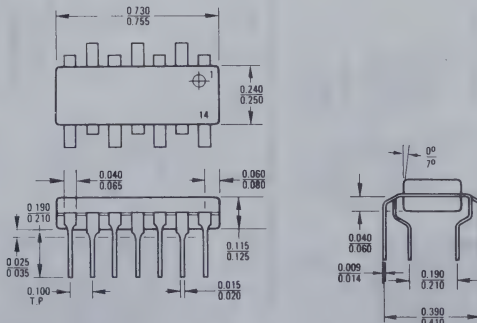
Identification dot on ceramic by pin 1

## CASE 646-02



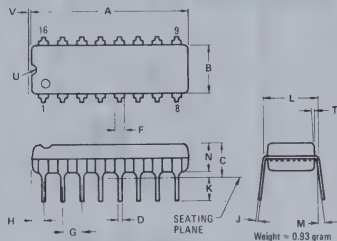
Dimension "L" to lead centerline when formed parallel

## CASE 647





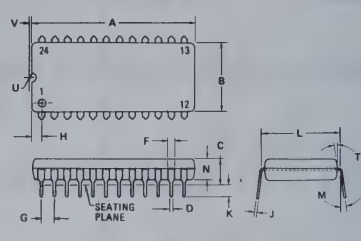
## CASE 648



DIM	MIN	MAX	MIN	MAX
A	20.70	21.21	.815	.835
B	6.09	6.60	.240	.260
C	4.07	4.57	.160	.180
D	.38	.51	.015	.020
E	1.14	1.40	.045	.055
F	2.54 BSC		.100 BSC	
G	1.32	1.83	.052	.072
H	.20	.30	.008	.012
J	2.92	3.43	.115	.135
K	7.37	7.87	.290	.310
L	1.02		.040	.065
M	.64	.89	.025	.035
N	.70 TYP		.025 TYP	
U	.64 RAD		.025 RAD	
V	.13	.38	.005	.015

NOTES:  
1. DIM "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.

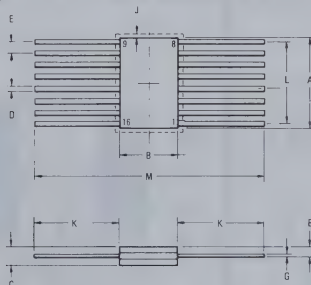
## CASE 649



DIM	MIN	MAX	MIN	MAX
A	31.50	32.00	1.240	1.260
B	13.08	13.84	.515	.545
C	4.70	5.21	.185	.205
D	.38	.51	.015	.020
E	1.02	1.65	.040	.065
F	2.54 BSC		.100 BSC	
G	1.65	2.16	.065	.085
H	.20	.30	.008	.012
J	2.92	3.43	.115	.135
K	14.99	15.49	.590	.610
L	1.02		.040	.065
M	.64	.89	.025	.035
N	.70 TYP		.025 TYP	
U	.64 RAD		.025 RAD	
V	.13	.38	.005	.015

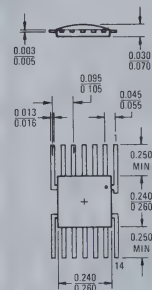
Dimension "L" to lead centerline when formed parallel.

## CASE 650



DIM	MIN	MAX	MIN	MAX
A	9.40	9.65	.370	.380
B	6.09	6.60	.240	.260
C	1.52	1.78	.060	.070
D	0.381	0.483	.015	.019
E	1.27 T.P.		.050 T.P.	
F	0.764	1.02	.030	.040
G	0.076	0.152	.003	.006
H	18.78		.740	-
J		0.381		.015
K	6.85		.250	
L	8.76	9.02	.345	.355
M	4.06	4.32	.160	.170

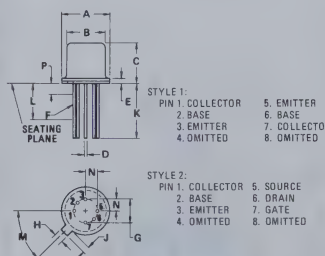
## CASE 651



Lead 1 identified by color dot or by elbow on lead.  
Top Cover made of silastic material.

Weight = 0.197 grams

## CASE 654-07

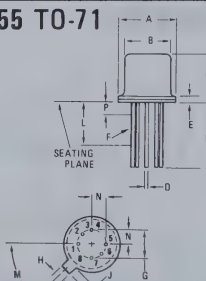


STYLE 1:  
PIN 1. COLLECTOR 5. EMITTER  
2. BASE 6. BASE  
3. EMITTER 7. COLLECTOR  
4. OMITTED 8. OMITTED

STYLE 2:  
PIN 1. COLLECTOR 5. SOURCE  
2. BASE 6. DRAIN  
3. EMITTER 7. GATE  
4. OMITTED 8. OMITTED

DIM	MIN	MAX	MIN	MAX
A	8.51	9.40	.335	.370
B	7.75	8.51	.305	.335
C	3.81	4.70	.150	.185
D	0.41	0.53	.016	.021
E	0.41	0.48	.016	.019
F	5.08 BSC		.200 BSC	
G	0.71	0.86	.028	.034
H	0.74	1.14	.029	.045
J	12.70	-	0.500	-
K	6.35	-	0.250	-
L	45° BSC		45° BSC	
N	2.54 BSC		.100 BSC	
P	-	1.27	-	.050

## CASE 655 TO-71



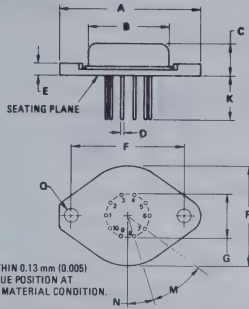
DIM	MIN	MAX	MIN	MAX
A	5.31	5.84	.209	.230
B	4.45	4.95	.175	.195
C	4.32	5.33	.170	.210
D	0.41	0.53	.016	.021
E	-	0.76	-	.030
F	0.41	0.48	.016	.019
G	2.54 BSC		.100 BSC	
H	0.91	1.17	.036	.046
J	0.71	1.22	.028	.048
K	12.70	-	0.500	-
L	6.35	-	0.250	-
M	45° BSC		45° BSC	
N	1.27 BSC		.050 BSC	
P	-	1.27	-	.050

All JEDEC dimensions and notes apply

Dimensions are in inches unless otherwise noted

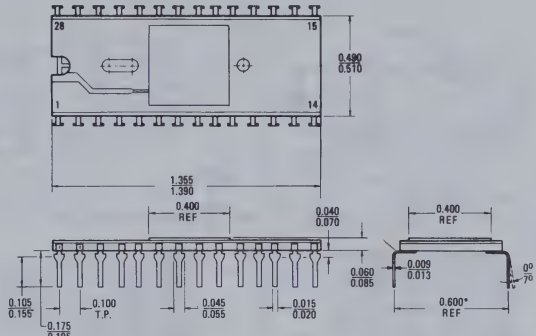


## CASE 662-01

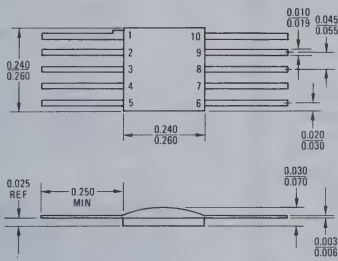


DIM	MIN	MAX	MIN	MAX
A	—	38.61	—	1.520
B	—	21.03	—	0.830
C	6.35	8.13	0.250	0.320
D	0.97	1.09	0.038	0.043
E	—	3.43	—	0.135
F	29.90	30.40	1.177	1.197
G	11.94 BSC	—	0.470 BSC	—
K	7.11	8.13	0.280	0.320
M	36° BSC	—	36° BSC	—
N	18° BSC	—	18° BSC	—
Q	3.84	4.09	0.151	0.161
R	—	26.67	—	1.050

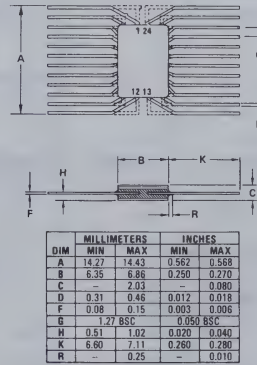
## CASE 663



## CASE 665

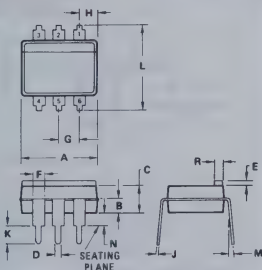


## CASE 667-01



NOTES:  
1. DIM "R" IS ALLOWABLE MENISCUS.  
2. DOTTED LEAD CONFIGURATION IS OPTIONAL.

## CASE 673-03



DIM	MIN	MAX	MIN	MAX
A	6.38	8.89	0.330	0.350
B	1.40	1.65	0.055	0.065
C	2.92	3.18	0.115	0.125
D	0.41	0.51	0.016	0.020
E	0.64	0.89	0.025	0.035
F	1.14	1.40	0.045	0.055
G	2.54 BSC	—	0.100 BSC	—
H	1.51	1.63	0.062	0.072
J	0.23	0.28	0.009	0.011
K	2.54	3.30	0.100	0.130
L	7.97	7.87	0.290	0.310
M	—	9°	—	9°
N	—	1.27	—	0.050
R	1.52	1.78	0.060	0.070

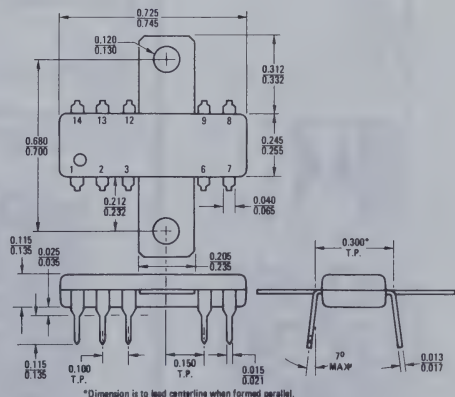
STYLE 1  
PIN 1. ANODE  
2. CATHODE  
3. N.C.  
4. ANODE  
5. CATHODE  
6. N.C.

STYLE 2  
PIN 1. ANODE  
2. CATHODE  
3. N.C.  
4. EMITTER  
5. COLLECTOR  
6. BASE

STYLE 3  
PIN 1. ANODE  
2. CATHODE  
3. N.C.  
4. EMITTER  
5. COLLECTOR  
6. N.C.

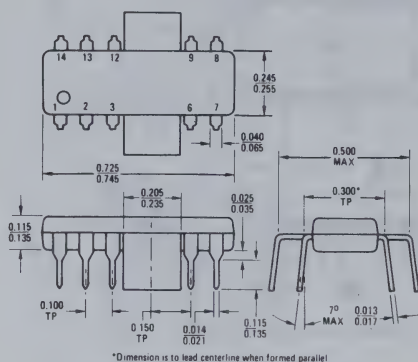
STYLE 4  
PIN 1. ANODE  
2. CATHODE  
3. N.C.  
4. CATHODE  
5. ANODE  
6. GATE

## CASE 675



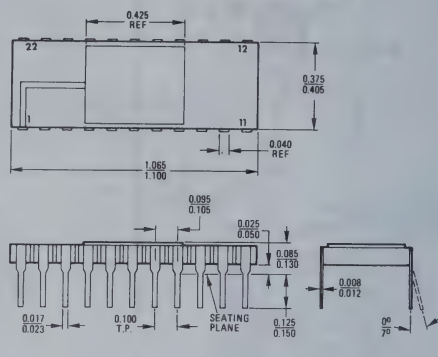


## CASE 676

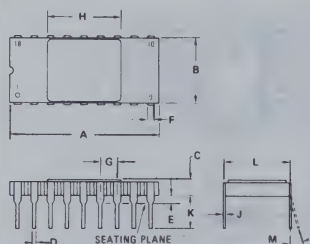


\*Dimension is to lead centerline when formed parallel

## CASE 677

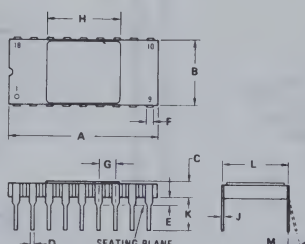


## CASE 680-01



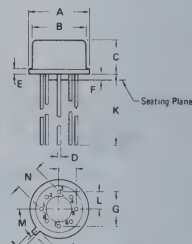
DIM	MIN	MAX	MIN	MAX
A	22.61	24.21	0.890	0.953
B	7.05	7.31	0.278	0.288
C	2.18	3.66	0.086	0.144
D	0.432	0.584	0.017	0.023
E	1.02	1.52	0.040	0.060
F	1.02	1.27	0.040	0.050
G	2.54	TP	0.100	TP
H	11.94	REF	0.470	REF
J	0.203	0.305	0.008	0.012
K	4.70	5.08	0.185	0.200
L	7.62	TP	0.300	TP
M	0°	10°	0°	10°

## CASE 680-02



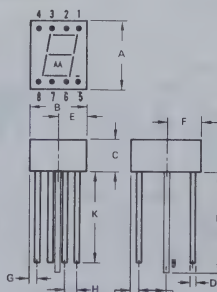
DIM	MIN	MAX	MIN	MAX
A	22.61	23.11	0.890	0.910
B	7.05	7.32	0.278	0.288
C	2.16	2.74	0.085	0.108
D	0.432	0.584	0.017	0.023
E	1.02	1.52	0.040	0.060
F	0.889	1.14	0.035	0.045
G	2.54	TP	0.100	TP
H	11.94	REF	0.470	REF
J	0.203	0.305	0.008	0.012
K	4.70	5.08	0.185	0.200
L	7.62	TP	0.300	TP
M	0°	10°	0°	10°

## CASE 681



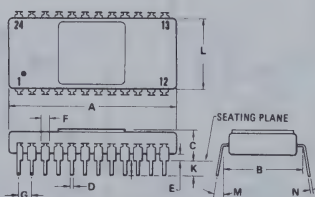
DIM	MIN	MAX	MIN	MAX
A	335	370	6.51	9.40
B	305	335	7.75	8.51
C	185	185	4.13	4.70
D	0.16	0.19	4.06	4.83
E	0.40	0.40	1.02	1.02
F	0.15	0.40	3.81	1.02
G	230	TP	5.84	TP
H	0.28	0.34	7.11	8.64
I	0.25	0.35	7.27	8.91
J	755	795	19.18	20.19
K	115	TP	2.92	TP
L	450	TP	450	TP
M	140	160	3.56	4.06
N	140	160	3.56	4.06

## CASE 683



DIM	MIN	MAX	MIN	MAX
A	0.255	0.275	6.730	6.990
B	0.215	0.225	5.460	5.720
C	0.140	0.140	3.560	3.560
D	0.016	0.020	0.406	0.508
E	0.110	TP	2.790	TP
F	0.135	TP	3.430	TP
G	0.030	1.035	0.762	1.089
H	0.050	TP	1.270	TP
J	0.035	0.040	0.889	1.020
K	0.340	0.360	8.540	9.140
L	0.400	0.410	10.160	10.410
M	0.100	TP	2.540	TP

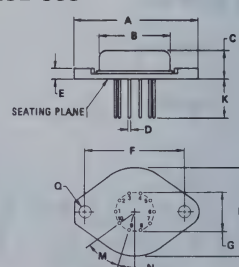
## CASE 684



DIM	MIN	MAX	MIN	MAX
A	1.140	1.290	28.96	32.77
B	590	610	14.99	15.49
C	120	180	3.05	4.57
D	0.15	0.20	3.8	5.1
E	0.20	0.50	5.1	12.7
F	0.40	0.60	1.02	1.52
G	100	BSC	2.54	BSC
H	115	165	2.92	4.19
L	500	560	12.70	14.22
M	10°	MAX	10°	MAX
N	0.12	0.11	20	30

NOTES:  
1. DIM "B" TO CENTER OF LEADS  
WHEN FORMED PARALLEL.  
2. LEAD NO. 1 CUT FOR IDENTIFICATION  
OR MARKED ON TP.

## CASE 685

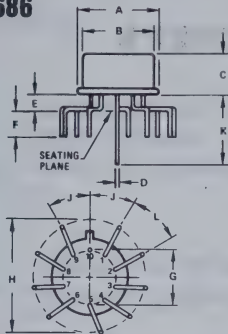


DIM	MIN	MAX	MIN	MAX
A	—	38.61	—	1.520
B	—	21.08	—	0.830
C	6.35	8.13	0.250	0.320
D	0.87	1.09	0.038	0.043
E	—	3.43	—	0.135
F	29.90	30.40	1.171	1.197
G	11.94	BSC	0.470	BSC
H	7.11	8.13	0.280	0.320
M	36°	BSC	36°	BSC
N	18°	BSC	18°	BSC
O	3.84	4.09	0.151	0.161
R	—	26.67	—	1.050

(See page 8-38 for lead form availability.)



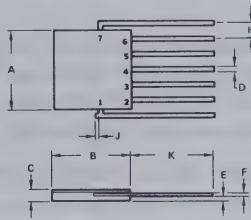
## CASE 686



\*Seven places: (between all leads except 5 & 6, 9 & 10, 10 & 1)

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.335	0.370	8.51	9.40
B	0.305	0.335	7.75	8.51
C	—	0.180	—	4.57
D	0.015	0.019	0.406	0.482
E	0.070	0.100	1.78	2.54
F	0.120	0.150	3.05	3.81
G	0.230 TP	—	5.84 TP	—
H	0.480 TP	—	12.19 TP	—
J	0.310 TP	—	7.87 TP	—
K	0.235	0.285	5.97	7.26
L	—	0.340 TP	—	8.63 TP

## CASE 687

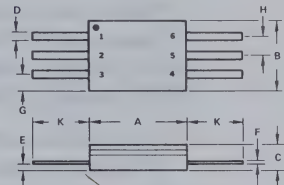


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.240	0.275	6.10	6.98
B	0.240	0.275	6.10	6.98
C	0.030	0.070	0.762	1.770
D	0.010	0.019	0.254	0.482
E	0.005	0.035	0.127	0.889
F	0.003	0.006	0.077	0.152
G	—	0.050 TP	—	1.270 TP
H	—	0.015	—	0.381
J	0.070	—	1.770	—

NOTES:

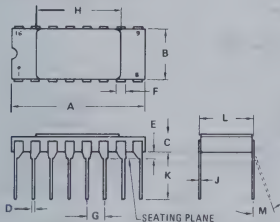
1. LEAD NO. 1 IDENTIFIED BY TAB (DIM "J")

## CASE 688



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.240	0.280	6.10	6.98
B	—	0.200	—	5.08
C	0.030	0.070	0.762	1.770
D	0.010	0.019	0.254	0.482
E	0.005	0.035	0.127	0.889
F	0.003	0.006	0.077	0.152
G	—	0.060	—	1.520
H	—	0.050 TP	—	1.270 TP
J	0.070	—	1.770	—

## CASE 690

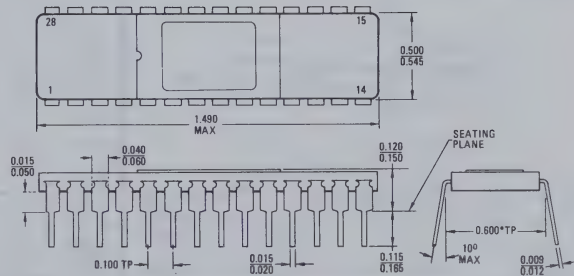


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.00	15.23	0.740	0.757
B	7.06	7.31	0.278	0.288
C	2.18	3.66	0.086	0.144
D	0.43	0.584	0.017	0.023
E	0.635	1.140	0.025	0.045
F	1.140	1.520	0.045	0.060
G	2.540 TP	—	0.100 TP	—
H	1.940 REF	—	0.077 REF	—
J	0.203	0.305	0.008	0.012
K	4.700	5.080	0.185	0.200
L	7.620 TP	—	0.300 TP	—
M	—	10°	—	10°

NOTES:

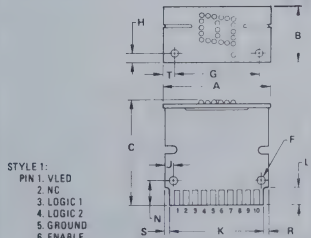
1. DIM. "L" TO CENTER OF LEADS WHEN FORMED PARALLEL

## CASE 695



\*Dimension is to lead centerline when formed parallel  
Lead number one cut for identification or marked on top

## CASE 697



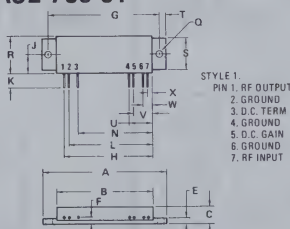
STYLE 1:  
PIN 1: VLED  
2: NC  
3: LOGIC 1  
4: LOGIC 2  
5: GROUND  
6: ENABLE  
7: LOGIC 4  
8: VCC  
9: LOGIC 3  
10: DECIMAL POINT

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	52.20	52.45	2.055	2.065
B	29.08	29.34	1.145	1.155
C	41.91	44.45	1.650	1.750
D	3.05	3.30	0.120	0.130
E	35.43	35.69	1.395	1.405
F	6.10	6.80	0.240	0.260
G	3.58	4.45	0.145	0.175
H	42.04	42.29	1.655	1.665
J	7.48	7.75	0.295	0.305
K	10.29	11.65	0.405	0.435
L	2.87	3.12	0.113	0.123
M	3.23	3.48	0.127	0.137
N	8.00	8.76	0.315	0.345

NOTES:

1. PINS 1 THRU 10 FIT STANDARD  
2. 3.96 mm (0.156) EDGE CONNECTORS  
3. CIRCUIT BOARD 1.57 mm (0.062) THICK

## CASE 700-01



STYLE 1:  
PIN 1: RF OUTPUT  
2: GROUND  
3: D.C. TERM  
4: GROUND  
5: D.C. GAIN  
6: GROUND  
7: RF INPUT

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	67.18	67.44	2.645	2.655
B	52.32	52.83	2.060	2.080
C	8.64	9.65	0.340	0.380
D	2.54	3.05	0.100	0.120
E	2.16	2.41	0.085	0.095
F	60.96	61.21	2.400	2.410
G	47.88	48.64	1.885	1.915
H	10.67	11.18	0.420	0.440
J	8.94	7.62	0.230	0.300
K	45.34	46.10	1.785	1.815
L	40.26	41.02	1.585	1.615
M	3.45	3.71	0.156	0.146
N	20.51	21.08	0.810	0.830
P	17.15	17.40	0.675	0.685
Q	2.92	3.18	0.115	0.125
R	12.32	13.08	0.485	0.515
S	9.78	10.54	0.385	0.415
T	4.70	5.46	0.185	0.215
U	2.16	2.92	0.085	0.115





# LEADFORMS

## FOR PLASTIC POWER SOCKETS

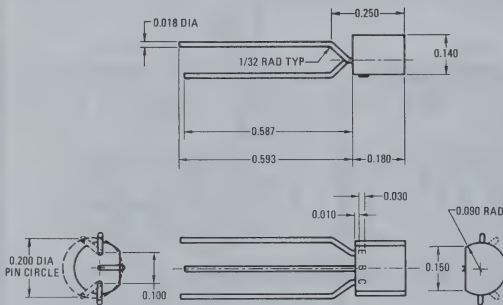
Plastic power transistors can be lead formed to a variety of configurations for insertion into sockets designed for metal-can devices. Leadform flexibility permits direct insertion into TO-66 and TO-5 sockets, or circuit-board mounting, either flat mount or flag mount.

A desired special leadform can be ordered as follows:

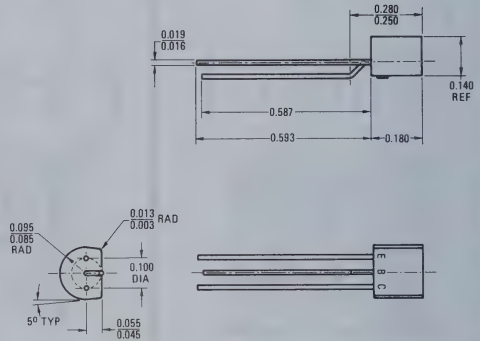
1. Select the desired transistor and case style, i.e., 2N5190 or MJE340.
2. Locate the selected case-style section in the leadform diagrams shown below.
3. Determine the leadform suffix letter (A, B, C, etc.) of the lead form required.
4. Add the lead form suffix letter to the transistor type number when placing your order. Example: 2N5190 lead form B; or MJE340 lead form A.

**DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.**

### CASE 29 LEAD FORM "A" (TO-92 TO FIT TO-5)



### CASE 29 LEAD FORM "B" (TO-92 TO FIT TO-18)



### CASE 29 STYLES



STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 2:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 3:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 5:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

STYLE 6:  
PIN 1. GATE  
2. SOURCE & SUBSTRATE  
3. DRAIN

STYLE 7:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 8:  
PIN 1. DRAIN  
2. GATE  
3. SOURCE & SUBSTRATE

STYLE 9:  
PIN 1. BASE 1  
2. EMITTER  
3. BASE 2

STYLE 10:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 11:  
PIN 1. ANODE  
2. CATHODE & ANODE  
3. CATHODE

STYLE 12:  
PIN 1. ANODE 1  
2. GATE  
3. ANODE 2

STYLE 13:  
PIN 1. ANODE 1  
2. GATE  
3. CATHODE 2

STYLE 14:  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE

STYLE 15:  
PIN 1. ANODE 1  
2. CATHODE  
3. ANODE 2

STYLE 16:  
PIN 1. ANODE  
2. GATE  
3. CATHODE

STYLE 17:  
PIN 1. COLLECTOR  
2. BASE  
3. EMITTER

### CASE 77 STYLES



STYLE 1  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE

STYLE 2  
PIN 1. CATHODE  
2. ANODE  
3. GATE

STYLE 3  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER

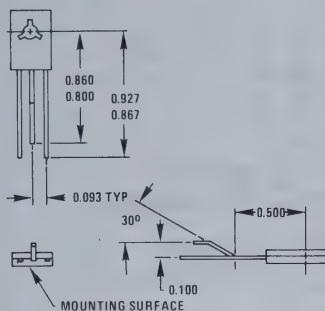
STYLE 4  
PIN 1. ANODE 1  
2. ANODE 2  
3. GATE

STYLE 5  
PIN 1. MT1  
2. MT2  
3. GATE

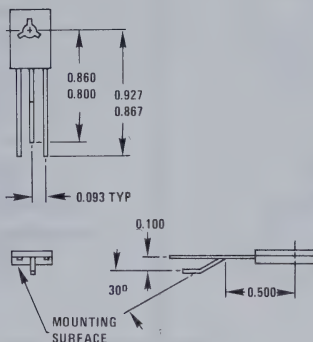
NOTE:  
1. MT = MAIN TERMINAL



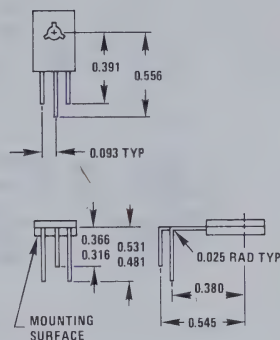
### CASE 77 LEAD FORM "A"



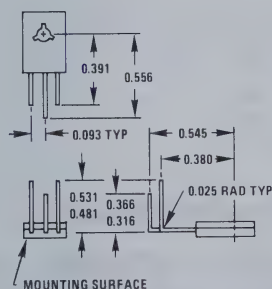
### CASE 77 LEAD FORM "B"



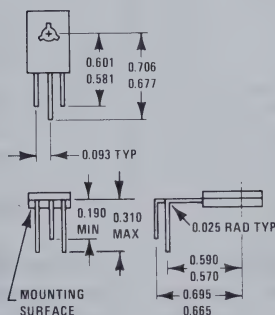
### CASE 77 LEAD FORM "C"



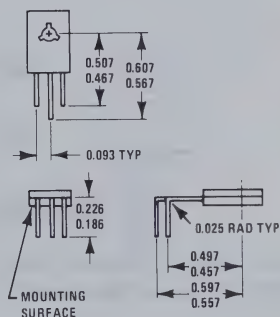
### CASE 77 LEAD FORM "D"



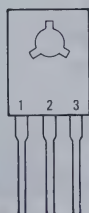
### CASE 77 LEAD FORM "E"



### CASE 77 LEAD FORM "F"

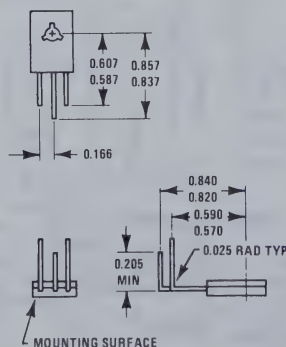


### CASE 90 STYLES



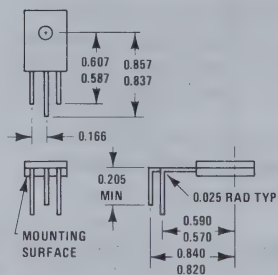
- STYLE 1  
PIN 1. CATHODE  
2. ANODE  
3. GATE
- STYLE 2  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE
- STYLE 3  
PIN 1. CATHODE  
2. GATE  
3. ANODE
- STYLE 4  
PIN 1. MT 1  
2. MT 2  
3. GATE

### CASE 90 LEAD FORM "A"

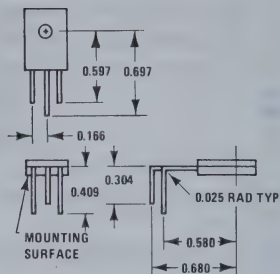




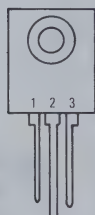
### CASE 90 LEAD FORM "B"



### CASE 90 LEAD FORM "C"

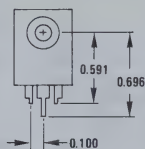


### CASE 199 STYLES

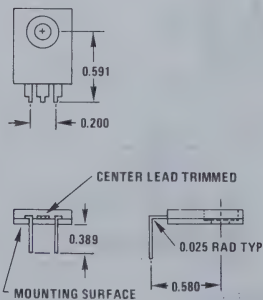


- STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER
- STYLE 2:  
PIN 1. CATHODE  
2. ANODE  
3. GATE
- STYLE 3:  
PIN 1. ANODE 1  
2. ANODE 2  
3. GATE

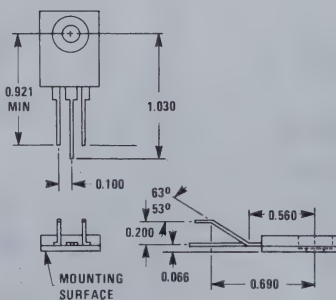
### CASE 199 LEAD FORM "A"



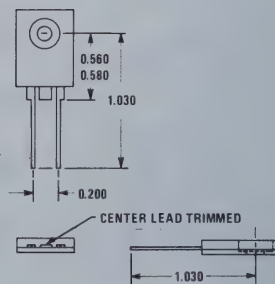
### CASE 199 LEAD FORM "B"



### CASE 199 LEAD FORM "C"

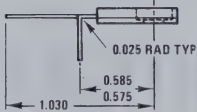
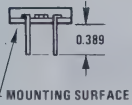
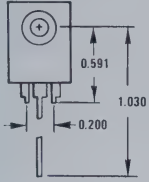


### CASE 199 LEAD FORM "D"

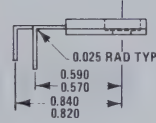
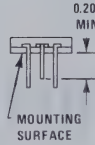
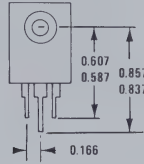




### CASE 199 LEAD FORM "E"



### CASE 199 LEAD FORM "F"



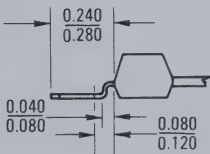
### Uni watt Package (Case 152)

This package is designed with the collector mounted on a metal tab that extends out of the plastic. The tab can be attached to a heat sink to conduct heat away from the junction.

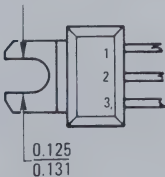
### CASE 683

This package has lead forming to facilitate insertion into a P C board with leads on .100" centers.

### CASE 152

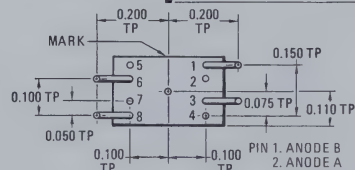
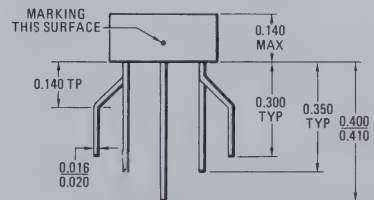


PIN 1. EMITTER  
2. BASE  
3. COLLECTOR



Tab formed for flush mounting available on request.

### CASE 683 LEAD FORM "A"



CASE 683  
(LEAD FORM "A")

PIN 1. ANODE B  
2. ANODE A  
3. ANODE G  
4. ANODE F  
5. DECIMAL POINT ANODE  
6. ANODE C  
7. ANODE D  
8. ANODE E  
9. COMMON CATHODE







# APPLICATION INFORMATION

Application Note Selection Guide  
Application Note Abstracts

9-1  
9-6



# APPLICATION NOTE SELECTION GUIDE

The Applications Notes listed below and described in the subsequent section, have been prepared to acquaint the circuits and systems engineer with the broad line of Motorola Semiconductor Products and their applications.

To obtain copies of these notes, simply list the AN number or numbers and send your request on your company letterhead to: Technical Information Center, Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, Arizona 85036.

APPLICATION NOTE NUMBER	APPLICATION CATEGORY
----------------------------	-------------------------

## AUDIO AMPLIFIERS

AN-182	A Method of Predicting Thermal Stability
AN-401	The MC1554 One-Watt Monolithic Integrated Circuit Power Amplifier
AN-426A	Low Power Audio Amplifiers Using Complementary Plastic Transistors
AN-483B	20 and 30 Watt Power Amplifiers Using Darlington Output Transistors
AN-484A	Medium Power Audio Amplifiers
AN-485	High-Power Audio Amplifiers with Short-Circuit Protection

## COMPUTER

AN-245A	An Integrated Core Memory Sense Amplifier
AN-464	MTTL Designer's Note—The MC4004/MC4005, A 16-Bit Random Access Memory
AN-465	MTTL Designer's Note—The MC4006/MC4007 Decoders
AN-474	The MC1541—A Gated Dual-Channel Sense Amplifier for Core Memories
AN-476	MTTL Designer's Note—The MC4000 Data Selector and the MC4002 Data Distributor
AN-487	A High-Speed Ripple-Through Arithmetic Processor
AN-488	High-Speed Addition Using Lookahead Carry Techniques
AN-496A	Error Detection and Correction Using Exclusive-OR Gates and Parity Trees
AN-505	The MC4012, an MTTL 4-Bit Shift Register
AN-506	Code Conversion with Semiconductor Read Only Memories
AN-528	Binary-to-BCD and BCD-to-Binary Conversion with Complex IC Functions
AN-530A	The MC7491A Eight-Bit Serial Shift Register and the MC7495 Four-Bit Shift Register
AN-533	Semiconductors for Plated-Wire Memories
AN-547	A High Speed Dual Differential Comparator, the MC1514
AN-550	Programming the MCM5003/5004 Programmable Read Only Memory
AN-573	Engineering Report: A Comparison Between MECL 10,000 and Schottky TTL Minicomputer Designs

## DIGITAL LOGIC CIRCUITS

### MDTL

AN-408	Problems and Solutions with MDTL and MRTL
AN-487	A High-Speed Ripple-Through Arithmetic Processor

APPLICATION NOTE NUMBER	APPLICATION CATEGORY
----------------------------	-------------------------

AN-496A	Error Detection and Correction Using Exclusive-OR Gates and Parity Trees
AN-519	Using MDTL Logic Blocks

### MECL

AN-194A	Designing Integrated Serial Counters
AN-270	Nanosecond Pulse Handling Techniques
AN-417	IC Crystal Controlled Oscillators
AN-418	High Speed Monostable Multivibrator Design with MECL Integrated Circuits
AN-456	A 50 MHz Programmable Counter Designed with MECL II Integrated Circuits
AN-488	High-Speed Addition Using Lookahead Carry Techniques
AN-496A	Error Detection and Correction Using Exclusive-OR Gates and Parity Trees
AN-504	The MC1600 Series MECL III Gates
AN-532A	MTTL and MECL Avionics Digital Frequency Synthesizer
AN-534	Commutating Filter Techniques
AN-536	Micro-T Packaged Transistors for High Speed Logic Systems
AN-556	Interconnection Techniques for Motorola's MECL 10,000 Series Emitter Coupled Logic
AN-565	Using Shift Registers as Pulse Delay Networks
AN-566	High Speed Binary Multiplication Using the MC10181
AN-567	MECL Positive and Negative Logic
AN-572	Initial Reliability Report for MECL 10,000 Integrated Logic Circuits
AN-573	Engineering Report: A Comparison Between MECL 10,000 and Schottky TTL Minicomputer Designs
AN-579	Testing MECL 10,000 Integrated Logic Circuits
AN-581	An MSI 500 MHz Frequency Counter Using MECL and MTTL
AN-583	A MECL 10,000 Main Frame Memory Employing Dynamic MOS RAMS
AN-584	Programmable Counters Using the MC10136 and MC10137 MECL 10,000 Universal Counters
AN-586	Measure Frequency and Propagation Delay with High Speed MECL Circuits
AN-592	AC Noise Immunity of MECL 10,000 Integrated Circuits

### MHTL

AN-298	Noise Immunity with High Threshold Logic
AN-414	Operations and Application of MHTL IC Flip-Flops

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APPLICATION NOTE NUMBER	APPLICATION CATEGORY
----------------------------	-------------------------

- |        |   |
|--------|---|
| AN-467 | Using Motorola High Threshold Logic             |
| AN-524 | Converting Relay Control Systems to Digital ICs |

**MRTL**

- |         |  |
|---------|--|
| AN-251A | Decade Counters Using MRTL Integrated Circuits             |
| AN-408  | Problems and Solutions with MDTL and MRTL                  |
| AN-451  | A Frequency Counter Using Motorola RTL Integrated Circuits |

**MTTL**

- |         |  |
|---------|--|
| AN-270  | Nanosecond Pulse Handling Techniques   |
| AN-464  | MTTL Designer's Note—The MC4004/MC4005, A 16-Bit Random Access Memory                        |
| AN-465  | MTTL Designer's Note—The MC4006/MC4007 Decoders  |
| AN-476  | MTTL Designer's Note—The MC4000 Data Selector and the MC4002 Data Distributor                |
| AN-488  | High-Speed Addition Using Lookahead Carry Techniques   |
| AN-492  | Operating Characteristics of Motorola MC3000/MC3100 Series Transistor-Transistor Logic Gates |
| AN-493  | The MC3000/MC3100 Series Transistor-Transistor Logic Flip-Flops                              |
| AN-496A | Error Detection and Correction Using Exclusive-OR Gates and Parity Trees                     |
| AN-505  | The MC4012, an MTTL 4-Bit Shift Register   |
| AN-506  | Code Conversion with Semiconductor Read Only Memories  |
| AN-528  | Binary-to-BCD and BCD-to-Binary Conversion with Complex IC Functions                         |
| AN-530A | The MC7491A Eight-Bit Serial Shift Register and the MC7495 Four-Bit Shift Register           |
| AN-532A | MTTL and MECL Avionics Digital Frequency Synthesizer   |
| AN-534  | Commutating Filter Techniques  |
| AN-537  | The MC4023, an MTTL 4-Bit Universal Counter  |
| AN-541  | Medium Scale Integration in the Numerical Control Field                                      |
| AN-550  | Programming the MCM5003/5004 Programmable Read Only Memory                                   |
| AN-573  | Engineering Report: A Comparison Between MECL 10,000 and Schottky TTL Minicomputer Designs   |
| AN-577  | Design Techniques for an 80 Watt, 175 MHz Transmitter for 12.5 Volt Operation                |
| AN-578  | UHF Microstrip Amplifiers Utilizing G-10 Epoxy-Glass Laminate                                |
| AN-581  | An MSI 500 MHz Frequency Counter Using MECL and MTTL   |

**MOS**

- |         |   |
|---------|---|
| AN-523  | MOS Multiplex Switches  |
| AN-538A | Motorola Complementary MOS Integrated Circuits                    |
| AN-539  | Interfacing with MOS Integrated Circuits                          |
| AN-558  | CRT Display with Dynamic MOS RAM Storage                          |
| AN-562  | MOS Dynamic RAMS in Memory Systems                                |
| AN-574  | CMOS: A New Logic Type for Control Systems                        |
| AN-583  | A MECL 10,000 Main Frame Memory System Employing Dynamic MOS RAMS |

APPLICATION NOTE NUMBER	APPLICATION CATEGORY
----------------------------	-------------------------

**FET**

- |         |  |
|---------|--|
| AN-211A | Field-Effect Transistors in Theory and Practice                            |
| AN-219  | The Field-Effect Transistor in Digital Applications                        |
| AN-220  | FET's in Chopper and Analog Switching Circuits                             |
| AN-231  | FET Differential Amplifier   |
| AN-455  | Using the FET Designers Data Sheet for Worst Case Amplifier Circuit Design |
| AN-462  | FET Current Regulators—Circuits and Diodes                                 |
| AN-511  | Low Frequency Applications of Field-Effect Transistors                     |

**INSTRUMENTATION & CONTROL**

- |         |  |
|---------|--|
| AN-220  | FET's in Chopper and Analog Switching Circuits   |
| AN-221  | 4-Layer and Current-Limiter Diodes Reduce Circuit Cost and Complexity                            |
| AN-225  | High Performance All Solid-State Servo Amplifiers  |
| AN-231  | FET Differential Amplifier   |
| AN-261A | Transistor Logarithmic Conversion Using an Operational Amplifier                                 |
| AN-297  | Integrated Circuits for High Frequency to Voltage Conversion                                     |
| AN-405  | DC Comparator Operations Utilizing Monolithic IC Amplifiers                                      |
| AN-437A | Design Considerations and Performance of Motorola Temperature-Compensated Zener Reference Diodes |
| AN-451  | A Frequency Counter Using Motorola RTL Integrated Circuits                                       |
| AN-470  | Bipolar Chopper Transistors and Circuits   |
| AN-471  | Analog-to-Digital Conversion Techniques  |
| AN-489  | Analysis and Basic Operation of the MC1595   |
| AN-510A | A Function Generator   |
| AN-524  | Converting Relay Control Systems to Digital ICs  |
| AN-534  | Commutating Filter Techniques  |
| AN-540  | A Synchronously Gated N-Decade Sweep Oscillator  |
| AN-541  | Medium Scale Integration in the Numerical Control Field  |
| AN-552  | The Control Engineer's Guide-to IC Applications  |
| AN-557  | Analog-to-Digital Cyclic Converter   |
| AN-559  | Simple RAMP A/D Converter  |
| AN-574  | CMOS: A New Logic Type for Control Systems   |
| AN-581  | An MSI 500 MHz Frequency Counter Using MECL and MTTL   |
| AN-582  | An Introduction to Using the MCBH7601 Cross-point Switch   |
| AN-586  | Measure Frequency and Propagation Delay with High Speed MECL Circuits                            |
| AN-589  | Generate Custom Waveforms Digitally  |

**MEMORIES, SOLID STATE**

- |        |   |
|--------|---|
| AN-464 | MTTL Designer's Note—The MC4004/MC4005, A 16-Bit Random Access Memory |
| AN-506 | Code Conversion with Semiconductor Read Only Memories                 |
| AN-550 | Programming the MCM5003/5004 Programmable Read Only Memory            |
| AN-558 | CRT Display with Dynamic MOS RAM Storage                              |
| AN-562 | MOS Dynamic RAMS in Memory Systems                                    |



APPLICATION NOTE NUMBER	APPLICATION CATEGORY
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AN-583	A MECL 10,000 Main Frame Memory System Employing Dynamic MOS RAMS
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OPERATIONAL AMPLIFIERS	
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AN-204A	High Performance Integrated Operational Amplifiers
AN-248	The MC1533 Voltage Monolithic Operational Amplifier
AN-273A	More Value out of Integrated Operational Amplifier Data Sheets
AN-403	Single Power Supply Operation of IC Op Amps
AN-407	A General Purpose IC Differential Output Operational Amplifier
AN-411	The MC1535 Monolithic Dual Op Amp
AN-439	MC1539 Op Amp and its Applications
AN-459	A Simple Technique for Extending Op Amp Power Bandwidth
AN-522	The MC1556 Operational Amplifier and its Applications
AN-587	Analysis and Design of the Op Amp Current Source

OPTOELECTRONICS	
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AN-440	Theory and Characteristics of Phototransistors
AN-508	Applications of Phototransistors in Electro-Optic Systems
AN-561	How to Use Photosensors and Light Sources
AN-571	Isolation Techniques Using Optical Couplers

POWER CONTROL	
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AN-140	Characterization of SCR's as Switches for Line Type Modulators
AN-189	Solid-State Pulse Width Modulation DC Motor Control
AN-240	SCR Power Control Fundamentals
AN-268	Pulse Triggering of Radar Modulator SCR's
AN-295	Suppressing RFI in Thyristor Circuits
AN-413	Unijunction Trigger Circuits for Gated Thyristors
AN-436	Conventional and Soft-Start Dimming of Incandescent Lights
AN-441	SCR Slaving Circuits
AN-443	Directional and Speed Control for Series, Universal and Shunt Motors
AN-445	Pulse-Width Modulation for DC-Motor Speed Control
AN-450	Induction Motor Speed Control
AN-453	Zero Point Switching Techniques
AN-466	Circuit Applications for the Triac
AN-482	Electronic Speed Control of Appliance Motors
AN-518	Constant-Speed Motor Control Using Tachometer Feedback
AN-575	Variable Speed Control System for Induction Motors
AN-590	Servo Motor Drive Amplifiers

POWER SUPPLY AND REGULATION	
-----------------------------	--

AN-169	A Low Voltage High Current Converter
AN-199	A Solid-State 15 kHz Power Inverter
AN-222	The ABCs of Solid-State DC to AC Inverters
AN-442	Designing DC-DC Converters for Capacitor Charging with Batteries

APPLICATION NOTE NUMBER	APPLICATION CATEGORY
----------------------------	-------------------------

AN-447	Fast Charging Systems for Ni-Cd Batteries
AN-469	Line Operated 15-kHz Inverter
AN-473	A Monolithic High-Power Series Voltage Regulator
AN-480	Regulators Using Operational Amplifiers
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**RADIO, AM/FM**

AN-432B	A Monolithic Integrated FM Stereo Decoder System
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AN-474	The MC1541—A Gated Dual-Channel Sense Amplifier for Core Memories
AN-533	Semiconductors for Plated-Wire Memories
AN-547	A High Speed Dual Differential Comparator, The MC1514

**TESTING**

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AN-422	Testers for Thyristors and Trigger Diodes
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**TRIGGER CIRCUITS (Thyristor Control)**

AN-221	4-Layer and Current-Limiter Diodes Reduce Circuit Cost and Complexity
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AN-287	Color IF Amplifier and AGC Circuit
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**UNIUNCTION**

AN-293	Theory and Characteristics of the Unijunction Transistor
AN-294	Unijunction Transistor Timers and Oscillators
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**VIDEO AMPLIFIERS**

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AN-491	Gated Video Amplifier Applications The MC1545



# APPLICATION NOTE ABSTRACTS

## **AN-139A Understanding Transistor Response Parameters**

This note explains high-frequency transistor response parameters and discusses their interdependence. Useful nomograms are given for determining  $h_{fe}$ ,  $f_T$ ,  $f_{ae}$ ,  $f_{max}$ , and many other parameters.

## **AN-140 Characterization of SCR's as Switches for Line Type Modulators**

Although Silicon Controlled Rectifiers are highly desirable as switches in DC pulse circuits, they are usually specified and characterized for AC applications only. This article discusses the SCR characteristics desirable for DC pulse applications, and proposes simple test circuits for evaluating such devices as pulse circuit switches. A device already characterized for such applications is described.

## **AN-147 High-Power Varactor Diodes: Theory and Application**

This article treats varactors in non-rigorous terms, discussing what they are, how they work, and how to use them in practical high-power, high-frequency, output circuits.

## **AN-151 Charge Storage Varactors for Extra UHF Power**

This report describes a varactor multiplier which may be used to achieve power outputs of more than 50 Watts at 150 MHz, and 20 Watts at 450 MHz. With such high-frequency capabilities, transistor-varactor combinations can replace triodes and klystrons in many UHF and microwave applications.

## **AN-159 Design Tips for Coaxial-Cavity Varactor Multipliers**

Most microwave engineers picture a coaxial cavity as a bulky construction, difficult to design easily. This report demonstrates that varactor multipliers can easily be designed as small as any other. Design principles and operational data for 500 MHz - 1000 MHz doublers are given.

## **AN-166 Using Linvill Techniques for RF Amplifiers**

A design procedure, derived from theory developed by J. G. Linvill, simplifies the design of single stage small-signal RF amplifiers. A 200 MHz amplifier serves as an example of the technique.

## **AN-169 A Low Voltage High Current Converter**

The output of low-voltage sources, i.e. solar cells, etc., often must be converted to a higher voltage to be

useful. Utilizing a high-performance power transistor to efficiently perform this task, this converter can switch currents as high as 50 amperes.

## **AN-176 Power Varactor Gives 5 Watts Output at 3 GHz**

A discussion of the design and performance of the high power 1N5151-53 varactors, including design details of a 1 GHz to 2 GHz frequency doubler and a 1 GHz to 3 GHz tripler.

## **AN-177 Two Stage Varactor Multiplier Provides High Power at 400 MHz**

This "times-eight" frequency multiplier can provide a nominal 40 Watts of CW power at an output frequency of 400 MHz with a conversion efficiency of 30 percent.

## **AN-178A Epicap Tuning Diode Theory and Applications**

General electronic-tuning considerations are discussed, including important parameters such as Q, tuning range, and temperature stability.

## **AN-182 A Method of Predicting Thermal Stability**

Variations in DC bias current with temperature is an important consideration in the design of reliable transistor audio amplifiers. This note gives a useful method of predicting the thermal stability of biasing circuits.

## **AN-189 Solid-State Pulse Width Modulation DC Motor Control**

Pulse-width modulation, an effective method of DC voltage control, provides motor speed regulation under varying torque conditions - ideal for traction drive vehicles.

## **AN-194A Designing Integrated Serial Counters**

MECL monolithic integrated J-K flip-flops serve as building blocks for ultra-high-speed ripple counters. General design techniques for designing counters of any arbitrary count.

## **AN-199 A Solid-State 15 kHz Power Inverter**

Fast-switching power transistors allows the design of a high-frequency power converter featuring minimum size and weight of reactive components.

## **AN-204A The MC1530, MC1531 Integrated Operational Amplifiers**

Two new high performance monolithic operational amplifiers feature exceptionally high input impedance and high open loop gain. This note describes



the function of each stage in the circuit, methods of frequency compensating and DC biasing. Four applications are discussed: a summing circuit, an integrator, a DC comparator, and transfer function simulation.

#### **AN-210 FM Modulation Capabilities of Epicap VVC's**

The author shows by empirical methods that the frequency vs. voltage curve for Epicap voltage variable capacitors is linear for small (sufficient for most FM modulator applications) voltage variations.

A rigorous mathematical explanation of this linear interdependence follows the empirical demonstration.

#### **AN-211A Field-Effect Transistors in Theory and Practice**

The basic theory, construction, and application information for field-effect transistors (junction and MOS types) are given. Also included are some typical test circuits for checking FET parameters.

#### **AN-213 Varactor Multipliers Provide High Output Power Above 6 GHz**

The author employs a high-performance varactor diode in the design of several multiplier circuits which feature exceptionally high output-power versus frequency capabilities. Among the circuits discussed are a 2 to 4 GHz doubler, a 2 to 6 GHz tripler, a 2.83 to 8.5 GHz tripler, and a 500 MHz to 4 GHz one-step multiplier.

#### **AN-215A RF Small-Signal Design Using 2-Port Parameters**

Power gain and stability of high-frequency transistors may be completely described by two port parameters.

This paper presents a summary of the overall design solution for the small-signal RF amplifier using two-port parameters. Design considerations and relationships for both the stable and the potentially unstable transistor are presented together with a discussion of neutralized, unneutralized, matched, and mismatched amplifiers.

#### **AN-219 The Field-Effect Transistor in Digital Applications**

Field-effect transistors have definite advantages over junction transistors in many digital applications; high fan-out, direct coupled circuitry (lower component count), extremely low power dissipation, and low temperature coefficient circuits are among the most important.

This paper provides the designer with an up-to-date discussion of JFET and MOSFET switching characteristics and how they are used in the design of basic digital circuits. The final portion of this paper discusses a family of JFET logic circuits, a family of MOSFET, and future prospects.

#### **AN-220 FET's in Chopper and Analog Switching Circuits**

The author's discussion begins with elementary chopper and analog switch characteristics—explores fully the considerations required for conventional and FET chopper and analog switch design—and finishes with specific FET circuit examples.

#### **AN-221 4-Layer and Current-Limiter Diodes Reduce Circuit Cost and Complexity**

The authors present four simple circuits in which 4-layer diodes and current-limiter diodes are used to provide increased circuit performance: A Saw-tooth generator (two variations), a staircase generator and a ring counter.

A brief discussion of the electrical characteristics of 4-layer and field-effect diodes precedes the circuit examples.

#### **AN-222 The ABCs of Solid-State DC to AC Inverters**

The author provides a comprehensive examination of the entire field of DC to AC inverters. Among the topics discussed are: the proper inverter for a specific application; operation principles of different types of inverters; the problem of proper device selection in the design of inverters; an inverter design example.

#### **AN-225 High Performance All Solid-State Servo Amplifiers**

The design of 7.5 Watt transformer-coupled solid-state servo amplifier and a 10 Watt complementary transistor servo amplifier are fully discussed. The transformer coupled amplifier, requiring only three transistors, provides a stable voltage gain of 100. The complementary amplifier, though more complex, is direct coupled throughout thus eliminating the transformer and its accompanying phase shift problems.

#### **AN-226 Thermal Measurements on Semiconductors**

This note describes the techniques used by Motorola to obtain the thermal resistance of transistors, rectifiers, and thyristors.

#### **AN-228 20 Watts at 1 GHz with Step Recovery Varactors**

Varactor harmonic multiplier circuit power handling capabilities have now been extended to 20 Watts at 1 GHz and 10 Watts at 2 GHz by two new varactors, the 1N5149 and 1N5150. This note provides a complete discussion of the design and performance of these two varactors. Several high performance multiplier circuits: - a 0.5 GHz to 1 GHz doubler; a 0.4 GHz to 1.2 GHz tripler; and a 0.46 GHz to 1.84 GHz quadrupler are also discussed.



**AN-231 FET Differential Amplifier**

The field-effect transistor is often a better choice than the bipolar transistor in many differential amplifier applications, particularly when high input impedance is required. This report discusses drift compensation of field-effect transistors for differential amplifier applications.

**AN-232 1.5 GHz 10 Watt Two-Stage Cascade Multiplier**

Two high-performance varactors—the 1N5149 and 1N5150—are employed in a cascade multiplier which features over 10 watts power output at 1.5 GHz.

**AN-238 Transistor Mixer Design Using 2-Port Parameters**

Mixer circuit design may be simplified by the use of small-signal admittance parameters. This note describes in detail the effective application of this design technique and the corresponding results. Several design examples are discussed.

**AN-240 SCR Power Control Fundamentals**

Relationships of control angle to peak voltage, average voltage, RMS voltage and power are presented in chart form. Time constant for relaxation oscillators are discussed for both DC and AC supplies. These basics form the heart of SCR control.

**AN-245A An Integrated Core Memory Sense Amplifier**

This application note discusses core memories and related design considerations for a sense amplifier. Performance and environmental specifications for the amplifier design are carefully established so that the circuit will work with any computer using core memories. The final circuit design is then analyzed and measured performance is discussed. The amplifier features a small uncertainty region (6 mV max), adjustable voltage gain, and fast cycle time (0.5  $\mu$ s).

**AN-247A An Integrated Circuit RF-IF Amplifier**

A new, versatile integrated circuit for RF-IF applications is introduced which offers high gain, extremely low internal feedback and wide AGC range. The circuit is a common-emitter, common-base pair (the cascade connection) with an AGC transistor and associated biasing circuitry. The amplifier is built on a very small die and is economically comparable to a single transistor, yet it offers performance advantages unobtainable with a single device. This application note describes the AC and DC operation of the circuit, a discussion of Y-parameters for calculating optimum power and voltage gain, and a variety of applications as an IF single-tuned amplifier, IF stagger-

tuned amplifier, oscillator, video-audio amplifier and modulator. A discussion of noise figure is also included.

**AN-248 The MC1533 Monolithic Operational Amplifier**

This note introduces a high voltage monolithic operational amplifier featuring high open loop gain, large common mode input signal, and low drift. The function of each stage in the circuit is analyzed, and methods for frequency compensating the amplifier are discussed. DC biasing parameters are also examined. Four applications using the amplifier are discussed: a source follower, a twin tee filter and oscillator, a voltage regulator, and a high input impedance voltmeter.

**AN-249 Designing Around the Tuning Diode Inductance**

The effect of varactor inductance is described, and equations and graphs are presented in order to predict the inductance value and to determine when its effects on performance is significant.

In addition, a design example of a varactor-tuned capacity-loaded half-wave cavity from 470 MHz to 890 MHz, and derivations of design equations for varactor tuned quarter wave and half-wave cavities as well as for lumped series tuned circuits are shown.

**AN-251A Decade Counters Using MRTL Integrated Circuits**

This application note discusses the design and implementation of decade counters using the MRTL family of integrated logic. Ripple counters, shift counters, and parallel clocked counters are developed using BCD, 2<sup>4</sup>21, and excess 3 digital codes. Up and down counting techniques are discussed. Output decoding, problem areas and circuit limitations are covered for all counter types.

**AN-260 Selecting Varactor Diodes**

High output power in the UHF region can be achieved with varactors. A device selection procedure based on experience, theory and common sense is offered.

**AN-261A Transistor Logarithmic Conversion Using an Operational Amplifier**

The design of a log amplifier using a common base transistor configuration as the feedback element of an integrated circuit operational amplifier circuit is discussed in this application note. Six decades of logarithmic conversion are obtained with less than 1% error of output voltage. The possible causes of error are discussed followed by two applications: direct multiplication of two numbers, and solution of the equation  $Z = X^N$ .



**AN-267 Matching Network Designs with Computer Solutions**

Computer solutions for four networks commonly used in solid-state high frequency amplifiers have been tabulated.

**AN-268 Pulse Triggering of Radar Modulator SCR's**

Factors involved in dynamic gate triggering are examined and relations of gate triggering characteristics to variations of total current amplifications with gate current are shown.

**AN-270 Nanosecond Pulse Handling Techniques In IC Interconnections**

The rapid advancement in the field of high speed digital integrated circuits has brought into focus many problem areas in the methods of pulse measurement techniques and new concepts dealing with these problems. This paper is intended to discuss the more common, yet perhaps not well known, pitfalls of measurement systems, a method of detecting them and possible solutions.

**AN-273A More Value out of Integrated Operational Amplifier Data Sheets**

The operational amplifier is rapidly becoming a basic building block in present day solid state electronic systems. The purpose of this application note is to provide a better understanding of the open loop characteristics of the amplifier and their significance to overall circuit operation. Also, each parameter is defined and reviewed with respect to closed loop considerations. The importance of loop gain stability and bandwidth is discussed at length. Input offset circuits are also reviewed with respect to closed loop operation.

**AN-282A Systemizing RF Power Amplifier Design**

The design of high-power, Class C, RF transistor amplifiers can be greatly simplified through the use of large-signal device characterization. This note explains design procedures and furnishes large-signal impedance data for eight Motorola RF power transistors.

**AN-287 Color IF Amplifier and AGC Circuit**

A non-neutralized, three-stage IF video amplifier is described. Included is the associated keyed AGC circuitry. The circuits were used in a transistorized color set built in the Applications Laboratory at Motorola.

**AN-290B Mounting Procedure for, and Thermal Aspects of, Thermopad Plastic Power Devices**

Many Motorola power devices are now available

in the Plastic Thermopad packages. Three package types are presently available. This application note provides information concerning the handling and mounting of these packages, as well as information on some thermal aspects.

**AN-293 Theory and Characteristics of the Unijunction Transistor**

This note discusses the theory of operation, the important characteristics and the behavior of the unijunction transistor under several operating conditions. In addition, a comparison is made between the different fabrication methods used to construct the UJT. Included is a table explaining UJT nomenclature.

**AN-294 Unijunction Transistor Timers and Oscillators**

Twelve different unijunction transistor circuits, complete with parts lists are given. Temperature stabilization of the peak-point voltage is examined and dynamic operation paths are discussed.

**AN-295 Suppressing RFI in Thyristor Circuits**

Measures taken to suppress RFI are shown. Design considerations and examples are explored as well as some solutions to the RFI problem.

**AN-297 Integrated Circuits for High Frequency to Voltage Conversion**

This application note concerns the technique of using integrated circuits in a linear frequency to voltage converter from 1 MHz to 30 MHz. A theoretical analysis is given as well as a working design.

**AN-298 Noise Immunity with High Threshold Logic**

A comparison of noise immunity characteristics is made between MHTL devices and standard saturated logic devices.

**AN-299 An IC Wideband Video Amplifier with AGC**

This application describes the use of the MC1550 as a wideband video amplifier with AGC. The analysis of a single stage amplifier with 28 dB of gain and 22 MHz bandwidth is given with the results extended to a 78 dB video amplifier with 10 MHz bandwidth.

**AN-401 The MC1554 One-Watt Monolithic Integrated Circuit Power Amplifier**

This application note discusses four different applications for the MC1554, along with a circuit description including DC characteristics, frequency response, and distortion. A section of the note is also devoted to package power dissipation calculations including the use of the curves on the power amplifier data sheet.



**AN-403 Single Power Supply Operation of IC Op Amps**

A split zener biasing technique that permits use of the MC1530/1531, MC1533, and MC1709 operational amplifiers and their restricted temperature counterparts MC1430/1431, MC1433 and MC1709C from a single power supply voltage is discussed in detail. General circuit considerations as well as specific AC and DC device considerations are outlined to minimize operating and design problems.

**AN-404 A Wideband Monolithic Video Amplifier**

This note describes the basic principles of AC and DC operation of the MC1552G and MC1553G, characteristics obtained as a function of the device operating modes, and typical circuit applications.

**AN-405 DC Comparator Operations Utilizing Monolithic IC Amplifiers**

The use of the MC1533 operational amplifier and the MC1710 differential comparator are discussed. The capabilities and performance are given along with typical operating curves for both devices.

**AN-406A UHF Broadband Amplifier Design**

A design technique is given for a wideband amplifier operating at UHF frequencies. A shunt-shunt feed-back network and Y-parameters at sampled frequencies are used.

**AN-407 A General Purpose IC Differential Output Operational Amplifier**

This application note discusses four different applications for the MC1520 and a complete description of the device itself. The final sections of the note discuss such topics as operation from single and split power supplies, frequency compensation, and various feedback schemes.

**AN-408 Problems and Solutions With MDTL and MRTL**

Problems which may be encountered in using MRTL or MDTL integrated circuits in low or medium speed systems are examined in this report. Methods of shaping clock waveforms, restrictions on input and output terminals when interfacing with discrete components, and techniques for extending temperature range are discussed.

**AN-411 The MC1535 Monolithic Dual Op Amp**

This note discusses two dual operational amplifier applications and an input compensation scheme for fast slew rate for the MC1535. A complete AC and DC circuit analysis is presented in addition to many of the pertinent electrical characteristics and how they might affect the system performance.

**AN-412 Duplexing with Step Recovery Varactors**

The switching function in a duplexer circuit can be performed automatically by a step recovery varactor, eliminating the need for an external bias circuit. In this note, two CW duplexers are described: a 133 MHz lumped constant component duplexer and a 450 MHz microstrip transmission line duplexer.

**AN-413 Unijunction Trigger Circuits for Gated Thyristors**

This note describes the methods of supplying controlled pulse widths in synchronization with the AC power line to gated thyristors. The unijunction transistor provides a simple and convenient means of obtaining such pulses as well as including feedback with very little additional circuitry.

**AN-414 Operation and Application of MHTL IC Flip-Flops**

A master-slave R-S and a dual J-K are the initial flip-flop elements available in the Motorola High Threshold Logic (MHTL) family. This note describes operation and characteristics of each unit and illustrates several applications of these devices.

**AN-415A Avoiding Second Breakdown**

The use of safe-area data, the physical mechanism of second breakdown and applications to various circuits are presented. Also included is a short discussion of test procedures and a typical test circuit used to establish safe area curves.

**AN-416 One-Step High Order Frequency Multipliers**

The circuits described in this report include the use of lumped constants, coaxial cavities, and waveguides. The design of lumped constant, low order multipliers is discussed in Application Notes AN-147 and AN-151 and coaxial cavity multiplier design is treated in Note AN-159. Therefore, only a brief outline of the X2 and X3 multiplier circuits will be given.

**AN-417A IC Crystal Controlled Oscillators**

Crystal controlled square wave oscillators can be used as clock drivers, harmonic sources for frequency markers, in frequency synthesizers, frequency comparators, etc. It is difficult to obtain high frequency square waves due to the long propagation delays of the most integrated circuits. The MECL 10,000 circuits with 2 ns propagation delays eliminate this problem. This note describes square wave oscillator circuits with crystal control that are capable of output frequencies, inverted and non-inverted, up to 200 MHz.



**AN-418 High Speed Monostable Multivibrator Design with MECL Integrated Circuits**

This note describes two configurations of monostable multivibrators using the MC1023 clock driver and a delay element. Operating frequencies in excess of 70 MHz and pulse widths of 4 nanoseconds are possible. Methods of obtaining the predetermined delay are also discussed.

**AN-419 UHF Amplifier Design Using Data Sheet Design Curves**

This note describes the design of UHF narrow-band amplifiers using the device loading admittances taken directly from the device data sheet. A design example is given in the form of a 1 GHz microstrip amplifier. Predicted results are compared to actual measured values. Also included is a short discussion on practical microstrip construction techniques.

**AN-421 Semiconductor Noise Figure Considerations**

A summary of many of the important noise figure considerations related with the design of low noise amplifiers is presented. The basic fundamentals involving noise, noise figure, and noise figure-frequency characteristics are then discussed with the emphasis on characteristics common to all semiconductors. A brief introduction is made to various methods of data sheet presentation of noise figure and a summary is given for the various methods of measurement. A discussion of low noise circuit design, utilizing many of the previously discussed considerations, is included.

**AN-422 Testers for Thyristors and Trigger Diodes**

This paper describes inexpensive go-no-go testers for thyristors and trigger diodes. Each is very simple to use and is well adapted to incoming inspection and other applications requiring fast testing of major parameters.

**AN-423 Field-Effect Transistor RF Amplifier Design Techniques**

Amplifier design theory utilizing the two port network model for an active device has been well developed and used extensively in bipolar transistor high frequency amplifier design.

This paper discusses some of the theoretical and practical considerations for using this popular method to design field effect transistor amplifiers.

**AN-426A Low-Power Audio Amplifiers Using Complementary Plastic Transistors**

The use of complementary-symmetry output transistors in low-power audio amplifiers enables the circuit designer to achieve maximum circuit perform-

ance at minimum component cost. This note describes several audio amplifier circuits suitable for power outputs of up to 2 watts with 8-, 16- and 40-ohm loads. Also described is a line-operated single-ended audio amplifier suitable for table-radio or television applications.

**AN-432B A Monolithic Integrated FM Stereo Decoder System**

This application note discusses the circuit approach that has been taken in the realization of the first monolithic integrated stereo multiplex decoder built for consumer usage, as well as some of the details concerning its incorporation in an FM stereo receiver.

**AN-436 Conventional and Soft-Start Dimming of Incandescent Lights**

This note describes two dimmers that provide wide-range control of incandescent light intensity by adjusting the angle of conduction in a series triac. One dimmer features simplicity for small size and low cost, while the other offers soft-start operation to limit inrush current and lengthen lamp life.

**AN-437A Design Considerations and Performance of Motorola Temperature-Compensated Zener Reference Diodes**

This application note defines Motorola temperature-compensated zener (reference) diodes, explains the device characteristics, describes electrical testing, discusses the advanced concepts of device reliability and quality assurance, and outlines device construction.

**AN-439 MC1539 Op Amp and its Applications**

This application note discusses the MC1539, a second generation operational amplifier. The general use and operation of the amplifier is discussed with special mention made of improved operation over that of its first generation predecessor—the 709 type amplifier.

In addition to the detailed discussion on the DC and AC operation of the device, considerable emphasis is placed on operational performance. Many applications are offered to demonstrate the device capability, including a high frequency feed-forward scheme, and a source follower application.

**AN-440 Theory and Characteristics of Phototransistors**

A brief history of the photo-electric effect is discussed, followed by a comprehensive analysis of the effect in bulk semiconductors, pn junctions and phototransistors. A model is presented for the phototransistor. Static and transient data for the MRD300



provide typical phototransistor characteristics. Appendices provide a discussion of the relationship of irradiation and illumination and define terms specifically related to phototransistors.

**AN-441 SCR Slaving Circuits**

This circuit makes use of a low-cost transistor to overcome the limitations of a conventional R-C discharge circuit in slave firing of an SCR. It is especially useful where zero-point switching techniques are employed to control large electrical loads.

**AN-442 Designing DC-DC Converters for Capacitor Charging with Batteries**

This paper outlines design considerations for converters used for charging energy-stored capacitors with low-voltage batteries. The ratio of capacitor voltage to battery voltage is chosen to be greater than 100.

A discussion of converter characteristics is presented here from the standpoint of efficiency, frequency of oscillation, rate of energy transfer from battery to capacitor, and peak battery current drain.

A complete circuit is included that is tolerant of semiconductor parameter variations and is thus suitable for economical mass production.

**AN-443 Directional and Speed Control for Series, Universal and Shunt Motors**

A simple circuit containing few components allows control of both speed and direction of rotation of DC motors. The use of thyristors provides continuous driver control through the speed range without compromising the torque characteristics of the motors.

**AN-445 Pulse-Width Modulation for DC-Motor Speed Control**

Feedback derived from a motor's armature and dependent on its speed can be used to counteract the reduction in speed that accompanies loading. This note describes two speed-control circuits which use different methods to obtain the feedback signal. One method uses voltage sensing, and the other an optical pickup.

**AN-447 Fast Charging Systems for Ni-Cd Batteries**

This note discusses the requirements and problems encountered in designing fast charging systems for nickel-cadmium (Ni-Cd) cells, including some cell characteristics affected by high-rate charging.

**AN-450 Induction Motor Speed Control**

A method of providing speed control above and below design speed for an induction motor is shown

in this note. Such speed control increases the versatility of an induction motor and permits it to be used in fulfilling requirements formerly satisfied only by DC motors.

**AN-451 A Frequency Counter Using Motorola RTL Integrated Circuits**

A frequency-period counter with a total hardware cost under \$200.00, based on unit quantity prices, is described. The instrument measures the periods and frequencies of periodic waveforms, ranging in frequency from 10 Hz to 20 MHz, and counts random occurrences for selected gate times of one millisecond to 10 seconds. A four digit decimal readout is provided. The low cost is achieved by utilizing plastic MRTL devices in unique versions of a crystal controlled oscillator, a period selector, a one shot multivibrator, a pulse shaper, and a switch contact bounce eliminator circuit.

**AN-453 Zero Point Switching Techniques**

This note discusses two unique pulse-type thyristor triggering circuits which meet the exact timing requirements of zero-point switching. They dissipate very little power and can be used with either sensitive or "shorted" gate devices.

**AN-454 AC Overcurrent Protective Circuit with Automatic Reset**

A unique circuit that will protect AC resistive loads from both overvoltage and overcurrent is shown. One feature of this circuit is that the sensing element is not in series with the load when the load is turned on.

**AN-455 Using the FET Designers Data Sheet for Worst Case Amplifier Circuit Design**

Basic information for the use of field-effect transistors is provided, and is an aid to complete understanding of the Designers Data Sheet. This report discusses the advantages, disadvantages, types and modes of operation of FETs and presents a definitive discussion of key parameters with their relationship to circuit design, when applicable.

**AN-456 A 50 MHz Programmable Counter Designed with MECL II Integrated Circuits**

A high speed programmable counter using the MECL II family of logic is discussed. The counter is designed to accept an input frequency up to 50 MHz and divide it by any number from 2 to 999. This number is programmed into three decades of synchronous down counters. These decades with additional decoding and control logic comprise a complete high speed divide-by-N counter system.



**AN-459 A Simple Technique for Extending Op Amp Power Bandwidth**

The design of fast response amplifiers is presented without the use of "tricky" compensation procedures.

**AN-460 Using Transient Response to Determine Operational Amplifier Stability**

Analysis and an example are given for a technique that evaluates the stability of any particular feedback amplifier configuration by analyzing its response to a step-function input.

**AN-461 Transient Suppression with a Power Zener Diode**

This note discusses sources of voltage transients and their detection, and describes transient suppression using power zener diodes designed for this purpose.

**AN-462 FET Current Regulators—Circuits and Diodes**

Included are numerous FET current sourcing circuits, along with an extensive treatment of the current regulating diode and its uses as a valuable component in circuit design.

**AN-464 M TTL Designer's Note—The MC4004/MC4005, A 16-Bit Random Access Memory**

Pertinent information for the design of high speed, non-destructive readout (NDRO) memory systems using the M TTL 16-bit memory chip is given. The topics discussed are: (1) operation of the 16-bit memory including typical read and write sequences, (2) typical DC and switching characteristics as a function of temperature, power supply, and output load, and (3) examples of memory system organization utilizing the 16-bit memory as the basic cell.

**AN-465 M TTL Designer's Note—The MC4006/MC4007 Decoders**

Operation and expansion capabilities and examples of the system use of the MC4006 Binary to One-of-Eight Decoder and the MC4007 Dual Binary to One-of-Four Decoder are discussed.

**AN-466 Circuit Applications for the Triac**

This note discusses the basic theory of operation of the triac with control methods and circuit applications. Among the applications included are basic switches, lamp dimmers, motor controls, a heater control, a flasher, a regulator, protective circuits and zero-point switching.

**AN-467 Using Motorola High Threshold Logic**

This application note explains operation of the Motorola High Threshold Logic (MHTL) family of integrated circuits. It briefly describes the members of the family and provides many of the characteristics of the units. Several examples are provided to aid the reader in the application of this unique logic family.

**AN-469 Line Operated 15-kHz Inverter**

The circuit shown in this note is a line-operated inverter. It makes use of high-voltage, high-frequency silicon power transistors to provide 120 Volts and 200 Watts at 15 Kilohertz. Because of the high frequency of operation, the components used can be small in size, resulting in a very compact inverter.

**AN-470 Bipolar Chopper Transistors and Circuits**

Bipolar transistor chopper circuits are used in many applications for low-drift amplification of DC and low-frequency AC signals. This note discusses the characteristics of transistors used as choppers and the circuits in which they can be used.

**AN-471 Analog-to-Digital Conversion Techniques**

The subject of analog-to-digital conversion and many of the techniques that can be used to accomplish it are discussed. The paper is written in general terms from a system point of view and is intended to assist the reader in determining which conversion technique is best suited for a given application.

**AN-472 Mounting and Heat Sinking Uni watt Plastic Transistors**

The Uni watt plastic package is now being used for several medium-power transistor types. This note describes several methods for mounting such devices, with emphasis on proper heat sinking for best thermal characteristics.

**AN-473 A Monolithic High-Power Series Voltage Regulator**

This note discusses MC1560/MC1561 voltage regulator in terms of internal operation, development of these circuits, and how they are advantageously used in supply fabrication.

**AN-474 The MC1541—A Gated Dual-Channel Sense Amplifier for Core Memories**

The MC1541 sense amplifier can provide many magnetic core memory systems with lower system cycle times and a lower package count than with previous sense amplifiers. Circuit operation, design considerations, interface problems and typical applications are discussed.



**AN-475 Using the MC1545—A Monolithic, Gated-Video Amplifier**

Because of the unique design of the MC1545, this amplifier can be used as a gated video amplifier, sense amplifier, amplitude modulator, frequency shift keyer, balanced modulator, pulse amplifier, and many other applications. This note describes the AC and DC operation of the circuit and presents applications of the device as a video switch, amplitude modulator, balanced modulator, pulse amplifier, and others.

**AN-476 MTTL Designer's Note—The MC4000 Data Selector and the MC4002 Data Distributor**

Two MTTL complex functions, the MC4002 four and two-channel data distributor, and the MC4000 dual four-channel data selector are discussed. Their basic modes of operation and expansion capabilities are described. Examples of the use of the data distributor and the data selector in various systems are presented.

**AN-477 A 30-Watt 175 MHz Power Amplifier Using PNP Transistors**

This note describes a three-stage power amplifier that delivers 30 Watts output at 175 MHz. It utilizes the first commercially available VHF PNP high-power transistors to provide 29 dB gain, 50% overall efficiency, and low spurious output.

**AN-478A Small-Signal RF Design with Dual-Gate MOSFETS**

The dual-gate MOSFET offers low noise, high gain, and excellent AGC, cross-modulation and overload characteristics in RF applications. Recent devices also feature silicon nitride passivation for ease of handling and reliability. This note discusses the characteristics of dual-gate MOSFETs, with emphasis on designing circuits, noise figure, AGC, bandwidth and detuning, cross-modulation and mixer operation.

**AN-480 Regulators Using Operational Amplifiers**

The theory of op amp voltage regulator design is discussed. The problem areas associated with such designs are also detailed. The MC1560 is used as a OTC voltage reference in the op amp regulator designs that are shown. It is shown that regulation from 0.01% to 0.001% is possible.

**AN-481 A Broadband 4-Watt Aircraft Transmitter**

This report describes a 4-Watt wideband AM aircraft transmitter intended for light aircraft. The frequency range is 118 to 136 MHz and no tuning is required when changing frequency. The RF circuitry can be operated from 12.5 Volts, or can be used with a series modulator described in the note from 26 Volts.

**AN-482 Electronic Speed Control of Appliance Motors**

This application note discusses the possibilities of controlling several types of induction motors, universal motors, and permanent-magnet motors, and includes circuit designs for each. By matching the motor to its electronic control, the designer can obtain a simple and efficient system.

**AN-483B 20 and 30 Watt Power Amplifiers Using Darlington Output Transistors**

Use of monolithic power Darlington output transistors can greatly simplify the design of high-fidelity amplifiers. Described herein is a 20-Watt amplifier which uses only three transistors, and a 30-Watt amplifier which uses four.

**AN-484A Medium-Power Audio Amplifiers**

This note describes a basic circuit design approach for audio complementary power amplifiers. Procedures are detailed for the selection of input, driver and output transistors. Both simple and Darlington transistor systems are included. Biasing, thermal considerations, overload protection and power supply information is given extensive treatment.

Design examples, including all circuit values, performance data and suggested P.C. board layouts, are given for simple transistor amplifiers at the 3, 5, 7, 10, 15, 20, 25, and 35 Watt levels. Also included are three amplifiers using Darlington output transistors at the 15, 20, and 25 Watt levels.

**AN-485 High-Power Audio Amplifiers with Short-Circuit Protection**

This application note describes a recommended circuit approach for high-performance audio amplifiers in the 35-Watt to 100-Watt RMS power range. Circuitry is included which enables the amplifier to operate safely continuously under any load condition including a short.

**AN-487 A High-Speed Ripple-Through Arithmetic Processor**

A simple, systematic building block approach for designing a high-speed, ripple-through arithmetic processor is described. Using only gates and full adders, ultra-high speed multiplication, division, square root extraction, addition, and subtraction may be performed. Several variations of an arithmetic processor design are detailed and comparisons of speed and package count using the MECL and MDTL logic in 14-pin, 16-pin, 24-pin, 32-pin, and 64-pin packages are given.

**AN-488 High-Speed Addition Using Lookahead Carry Techniques**

The use of the lookahead carry principle to



increase the operating speed of adder systems is described. Several adders of different sizes using variations of lookahead carry are developed and the logical implementation of these using the MTTL III and MECL II and III logic families is given.

**AN-489 Analysis and Basic Operation of the MC1595**

The MC1595 monolithic linear four-quadrant multiplier is discussed. The equations for the analysis are given along with performance that is characteristic of the device. A few basic applications are given to assist the designer in system design.

**AN-491 Gated Video Amplifier Applications  
The MC1545**

This application note reviews the basic operation of the MC1545 and discusses some of the more popular applications for the MC1545. Included are several modulator types, temperature compensation of the active gate, AGC, gated oscillators, FSK systems, and single supply operation.

**AN-492 Operating Characteristics of Motorola MC3000/  
MC3100 Series Transistor-Transistor Logic  
Gates**

This application note explains the advantages of using the MC3000/MC3100 Series of conventional TTL. Design data is included which should allow determination of the operating characteristics under almost any set of conditions.

**AN-493 The MC3000/MC3100 Series Transistor-  
Transistor Logic Flip-Flops**

This application note explains the basic operation of the various flip-flops available in the MC3000/MC3100 series of transistor-transistor logic from Motorola. Typical operating characteristics are included so that operation under different conditions can be determined.

**AN-495 A 25-Watt, 175 MHz Transmitter for 12.5-Volt  
Operation**

This note describes the power amplifier stages of a 175-MHz 25-watt transmitter. The transmitter requires a 12.5 Volt DC power source and is therefore suitable for operation directly from the electrical system of a 12-Volt vehicle.

**AN-496A Error Detection and Correction Using  
Exclusive-OR Gates and Parity Trees**

The availability of Exclusive OR gates and parity trees allows digital system designers to use error detection and correction codes to improve their system reliability and maintainability without the major cost penalty that has existed in the past. Use of

Exclusive-OR gates and parity trees available in the MRTL, MTTL, MDTL, and MECL families to design simple parity and single error Hamming parity detection and correction circuits is discussed.

**AN-498 Voltage and Current Boost Techniques Using  
The MC1560-61**

The stability requirements for the current boosted MC1560-61 are discussed. Both internal and external compensation techniques are shown, along with heat-sink design information and typical circuits, including a self-oscillating switching regulator, and a voltage boost circuit.

**AN-499 Shutdown Techniques for the MC1560-61/69  
Monolithic Voltage Regulators**

This note discusses the many ways one can use the shutdown control for the MC1560 Monolithic Voltage Regulator. These include logic control, short circuit detection, over voltage detection, junction temperature control, and thermal feedback. Also discussed, are current foldback and methods of restarting automatically from the shutdown state. The techniques discussed apply equally to the MC1560, MC1561, and MC1569 positive voltage regulators.

**AN-500 Development, Analysis, and Basic Operation of  
the MC1560-61 Monolithic Voltage Regulators**

In this note, the analysis and basic operation of the MC1560 and the MC1561 voltage regulators are discussed. The tests and parameters used on the data sheet are considered, and the problems of specifying a monolithic voltage regulator are identified. The basic circuit configurations are shown with some insight for the typical performance one can expect.

**AN-502A A 40-Watt, 50-MHz, Transmitter for 12.5-Volt  
Operation**

This report describes a three stage, three transistor transmitter capable of providing 40 Watts continuous power output at 50 MHz in operation from a 12.5 Volt supply.

The synthesis of the matching networks in the transmitter is greatly simplified by the application of a design procedure utilizing large-signal transistor impedance data.

**AN-503 A 25-Watt Broadband Aircraft Transmitter**

This report describes a wideband aircraft transmitter with a typical carrier output of 25 Watts. The frequency range is 118-136 MHz and no tuning is required. The supply voltage is 13.6 Volts.

**AN-504 The MC1600 Series MECL III Gates**

This application note explains the basic opera-



tion of the various gates available in the MECL III logic family. Typical operating characteristics are included as an aid to the designer of high-speed logic along with recommended layout, breadboarding, and testing procedures. This note will also provide the designer with some insight into the overall capabilities of this logic line as they apply to this application.

#### **AN-505 The MC4012, A MTTL 4-Bit Shift Register**

The MC4012 is a 4-bit shift register consisting of four D-type flip-flops operated in the synchronous mode and may be used for temporary storage of information. The MC4012 may be operated in either the parallel or serial mode input depending upon the logic state of the mode control. Circuit operation and various applications of the device are the subject of this application note.

#### **AN-506 Code Conversion with Semiconductor Read Only Memories**

In digital systems, data is manipulated and transmitted in coded form and frequently must be translated from one code into another. The use of ready only memories to perform the various code conversions is discussed in this note. In particular, methods for converting data from the binary code to the binary coded decimal representation, and vice versa, are detailed. Conversion from the Hollerith code to the common 8-bit codes, such as the RS-358, ASC II, and EBCDIC codes, as well as conversions between the 8-bit codes are also treated.

#### **AN-507 A 13-Watt Broadband AM Aircraft Transmitter**

This report describes a wideband AM aircraft transmitter with a typical carrier output level of 13 Watts. The frequency range is 118 to 136 MHz with no tuning required. The supply voltage for the transmitter is 13.6 Volts. A transformerless series modulator is also described, and with this system, a 27.2-Volt supply is required. Lower-power 2.5 and 7-Watt transmitters are also included.

#### **AN-508 Applications of Phototransistors in Electro-Optic Systems**

This note reviews phototransistor theory, characteristics and terminology, then discusses the design of electro-optic systems using device information and geometric considerations. It also includes several circuit designs that are suited to DC, low-frequency and high-frequency applications.

#### **AN-509 True RMS Voltage Regulators**

This note describes AC voltage regulators that are ideal for use with electronic and electrical equipment such as lamps and heaters that are highly

sensitive to supply voltage. These regulators maintain constant RMS voltage levels for input or load changes.

#### **AN-510A A Low-Cost, Solid-State Function Generator**

This report describes an inexpensive function generator with sine-, square-, and triangular-wave outputs. A combination of discrete and integrated circuits provide lowest cost without sacrificing good performance. Maximum output amplitude of all waveforms is 20 Volts peak to peak from a 50-Ohm output impedance. Frequency range is 1 Hz to 1 MHz.

#### **AN-511 Low Frequency Applications of Field-Effect Transistors**

Field-effect transistors enjoy usage in a wide range of applications at both high and low frequencies. This report discusses the low-frequency applications, with an emphasis on the lesser-known uses. General topics covered are switches and choppers, amplifiers, voltage-variable resistors, current limiters, and microwatt logic.

#### **AN-512 Applications of Fast-Recovery Rectifiers**

Many applications that use silicon rectifiers at high frequencies or repetition rates can be improved with fast-recovery diodes. This note discusses the characteristics of these diodes and describes typical applications in which they excel.

#### **AN-513 A High Gain Integrated Circuit RF-IF Amplifier with Wide Range AGC**

This note describes the operation and application of the MC1590G, a monolithic RF-IF amplifier. Included are several applications for IF amplifiers, a mixer, video amplifiers, single and two-stage RF amplifiers.

#### **AN-517 Improving the Efficiency of Low-Voltage, High-Current Rectification**

The efficiency of low-voltage, high-current rectification can be improved by using either barrier rectifier diodes or synchronous rectification. This note discusses both approaches and compares them to the use of conventional silicon rectifiers.

#### **AN-518 Constant-Speed Motor Control Using Tachometer Feedback**

A simple tachometer can provide feedback control for shaded-pole motors and better brush life for universal motors. This note describes pickups and circuits suitable for use in such equipment as home appliances and power tools.



**AN-519 Using MDTL Logic Blocks**

This application note discusses typical applications of basic MDTL components such as gates and flip-flops, with emphasis placed on the positive logic AND, OR, NOR, NAND, and Exclusive-OR functions. Methods of interfacing MDTL with other popular logic families are also discussed.

**AN-521 Using Balanced Emitter Transistors in RF Applications**

Motorola Balanced Emitter Transistors provide excellent performance and resistance to burnout under conditions of mismatching and detuning in high-frequency power amplifiers. This note describes the characteristics and typical applications of these transistors.

**AN-522 The MC1556 Operational Amplifier and its Applications**

This application note discusses the MC1556, a second generation, internally compensated monolithic operational amplifier. Particular emphasis is placed on its distinct advantages over the early 709-type amplifier and the more recent 741-type amplifier.

Along with a description of its operation this note presents a discussion on various applications of the MC1556, highlighting its capabilities, and points out its characteristics so the reader may make effective use of the device.

**AN-523 MOS Multiplex Switches**

The characteristics and parameters of the MC1150 and the MC1151 MOS Multiplex Switches are described and the use of these devices in multiplexers and decoder drivers is discussed. Also included is a discussion of logic level translators for interfacing these MOS devices with other logic lines such as RTL, DTL, and TTL.

**AN-524 Converting Relay Control Systems to Digital ICs**

Basic Boolean Algebra and logic functions are defined and discussed. A method of converting relay diagrams to logic diagrams is then presented. Several examples and a system design illustrate the conversion method using MHTL.

**AN-526 Theory, Characteristics and Applications of Silicon Unilateral and Bilateral Switches**

The SUS/SBS are constructed as simple integrated circuits which perform as gated or voltage sensitive switches. Device theory and operation are explained plus circuit applications in the areas of power thyristor triggering and logic. Devices illus-

trated include the MUS4987-88 and the MBS4991-92.

**AN-527 Theory, Characteristics and Applications of the Programmable Unijunction Transistor**

This note discusses the characteristics of a programmable unijunction transistor (PUT) and offers comparisons with the Annular unijunction. Also included are several circuits showing the versatility of the PUT.

**AN-528 Binary-to-BCD and BCD-to-Binary Conversion With Complex IC Functions**

Complex function integrated circuits reduce the cost of performing conversion from binary to the BCD code or from the BCD code to binary. Four methods of performing each conversion are discussed and compared.

**AN-529 Regulated Line Operated Inverter Uses High Voltage Power Transistors and Hot Carrier Rectifiers**

This report describes a line operated 225 Watt preregulated power supply which offers considerable reductions in overall size and weight as compared to more conventional techniques of obtaining low voltages at high currents.

**AN-530A The MC7491A Eight-Bit Serial Shift Register and the MC7495 Four-Bit Shift Register**

Operation of the MC5491A/7491A 8-bit shift register and the MC5495/7495 4-bit universal shift register is discussed. Typical applications are covered for each device and use of the two devices in a data transmission system is illustrated.

**AN-531 MC1596 Balanced Modulator**

The MC1596 monolithic circuit is a highly versatile communications building block. In this note, both theoretical and practical information are given to aid the designer in the use of this part. Applications include modulators for AM, SSB, and suppressed carrier AM; demodulators for the previously mentioned modulation forms; frequency doublers and HF/VHF double balanced mixers.

**AN-532A MTTL and MECL Avionics Digital Frequency Synthesizer**

This application note discusses several approaches that illustrate applications of complex digital integrated circuits directed toward avionics frequency synthesizers. The techniques presented point out the simplicity with which both MTTL and MECL digital integrated circuits can be used to produce frequency synthesis for avionic communications.



**AN-533 Semiconductors for Plated-Wire Memories**

An introduction to the operation and electrical characteristics of plated-wire memories is provided in conjunction with the applications of semiconductors that interface with the plated-wire memories.

Devices discussed include drivers, sense amplifiers, and decoders. Memory organization and memory-related semiconductor applications are also mentioned.

**AN-534 Commutating Filter Techniques**

This note describes the design and construction of commutating (digital) filters using Motorola MECL II, MTTL III and MC7400 digital integrated circuits. A short section on commutating filter theory is included along with examples of filters and their responses.

**AN-535 Phase-Locked Loop Design Fundamentals**

The fundamental design concepts for phase-locked loops implemented with integrated circuits are outlined. The necessary equations required to evaluate the basic loop performance are given in conjunction with a brief design example.

**AN-536 Micro-T Packaged Transistors for High Speed Logic Systems**

Integrated circuits have become the first thought of most designers faced with a digital problem. For specialized needs such as extremely high speed, high speed with minimum power dissipation, or unusual logic functions, however, discrete transistors in the ultra-small Micro-T package may prove advantageous.

**AN-537 The MC4023, An MTTL 4-Bit Universal Counter**

The MC4023 Universal Counter can be connected to count any number from two through twelve except seven and eleven. For all settings, counting is in a binary sequence from count zero to the selected number. Operating characteristics and applications of the device are the subject of this application note.

**AN-538A Motorola Complementary MOS Integrated Circuits**

This note discusses some of the properties of N-channel and P-channel MOSFETs and describes how they are used to construct complementary MOS integrated circuits. Some basic CMOS logic functions are then discussed and methods of cascading CMOS counters are given.

**AN-539 Interfacing With MOS Integrated Circuits**

This application note discusses the problem of interfacing MOS integrated circuits with the logic levels of MECL, MDTL, MTTL, and MRTL. The emphasis is placed primarily on the use of other integrated circuits to achieve this interfacing.

**AN-540 A Synchronously Gated N-Decade Sweep Oscillator**

This report describes a unique solid-state sweep oscillator system which hypothetically can be swept over any frequency range. The prototype discussed herein is swept over only five decades. Options are provided to preselect any one, two or five frequency decades between 10 Hz and 10 MHz, whether sequential or not.

**AN-541 Medium Scale Integration in the Numerical Control Field**

Since medium scale integration means complex functions, the logic design engineer must understand both the product and its end use in order that his design be optimized. Transistor-Transistor Logic has a number of devices such as programmable counters, phase detectors, voltage controlled multivibrators, comparators, etc., which are available today in integrated circuit form. The devices can be applied to the numerical controls field and are the subject of this paper.

**AN-543 Integrated Circuit IF Amplifiers for AM/FM and FM Radios**

This application note discusses the design and performance of four IF amplifiers using integrated circuits. The IF amplifiers discussed include a high performance circuit, a circuit utilizing a quadrature detector, a composite AM/FM circuit, and an economy model for use with an external discriminator.

**AN-544A Printed Circuit VHF TV Tuners Using Tuning Diodes**

Two printed circuit VHF varactor tuners were designed and built in the Motorola Applications Laboratory. Both designs were centered around tuning diodes, PIN band switching diodes, the dual-gate MOSFET, and a cascode mixer. One tuner uses a high capacitance tuning diode while the other uses a low capacitance device. This note describes the tuners, the design procedures, and the tuner performance.

**AN-545 Television Video IF Amplifier Using Integrated Circuits**

This applications note considers the requirements of the video IF amplifier section of a television receiver, and gives working circuit schematics using



integrated circuits which have been specifically designed for consumer oriented products. The integrated circuits used are the MC1350, MC1352, MC1353 and the MC1330.

#### **AN-546 Solid-State Linear Power Amplifier Design**

Linear amplifier design techniques and new RF power transistors developed specifically for HF (2-30 MHz) linear amplifier service are discussed.

#### **AN-547 A High-Speed Dual Differential Comparator, The MC1514**

This application note discusses a few of the many uses for the MC1514 dual comparator. Many applications such as sense amplifiers, multivibrators, and peak level detectors are presented.

#### **AN-548 Microstrip Design Techniques for UHF Amplifiers**

The design and construction of a 25-Watt UHF power amplifier utilizing microstrip techniques for the 450 to 512 MHz band is discussed. The amplifier utilizes the 2N5945, 2N5946 and 2N6136 RF power transistors.

#### **AN-549 A Vertical Deflection Circuit Using Complementary Transistors**

A vertical deflection system for television sets is discussed which uses complementary transistors in the output stage to avoid the need for an output transformer. This system consists of two separate circuits—an oscillator and a power amplifier—either of which can be used separately or as part of a different system. The oscillator produces a sawtooth voltage waveform. The power amplifier converts a sawtooth voltage waveform into a sawtooth current waveform to drive the scan coils.

#### **AN-550 Programming the MCM5003/5004 Programmable Read Only Memory**

This note describes programming methods for the MCM5003/5004 512-bit (64x8) TTL Programmable Read Only Memory (PROM). These program methods can result in short design cycles for custom ROM circuits. Operation and circuit details of the MCM5003/5004 are given first. Then programming methods and circuitry are discussed. The simplest programmer uses only five ICs, while a more sophisticated programmer, using automatic sequencing, requires a total of 25 ICs.

#### **AN-551 Tuning Diode Design Techniques**

Epicap tuning diodes offer many advantages over air variable capacitors. However, some applications their capacitance drift with temperature

changes must be overcome with suitable compensation techniques. This note discusses a number of considerations to be employed in designs using tuning diodes.

#### **AN-552 The Control Engineer's Guide to IC Applications**

This report is a guide to the use of integrated circuits, and as such provides practical solutions to a number of common problems encountered in circuits used for sensing and control which must operate in an industrial environment. The report is divided into two parts—digital ICs and linear ICs.

#### **AN-553 A New Generation of Integrated Avionic Synthesizers**

The need to generate signals of a multitude of different frequencies for avionic systems has resulted in complex solutions in the past. With the introduction of certain standard product integrated circuits, frequency synthesis using digital phase locked loop techniques presents a more practical solution. Several different types of servo phase locked loop systems are discussed and a practical design example is given. Results of design examples are presented along with possible applications.

#### **AN-555 Mounting Stripline-Opposed-Emitter (SOE) Transistors**

The basic construction of the Stripline-Opposed-Emitter package used for many RF power transistors is described. Methods of mounting and heat-sinking both stud and flange type packages which allow best utilization of the transistor's dynamic and thermal properties are discussed. These mounting methods prevent the possibility of device damage due to improper mounting techniques.

#### **AN-556 Interconnection Techniques for Motorola's MECL 10,000 Series Emitter Coupled Logic**

This application note describes some of the characteristics of high speed digital signal lines and gives wiring rules for MECL 10,000 emitter coupled logic. The note includes discussions of printed circuit board interconnects, board-to-board interconnects, and wirewrapping techniques.

#### **AN-557 Analog-to-Digital Cyclic Converter**

The A/D cyclic converter discussed in this note provides medium speed (1.5μs/bit) and medium accuracy (7 or 8 bits) operation. A Cyclic converter uses the successive approximation technique in which an unknown analog input voltage is successively compared to a reference voltage to determine each bit of the digital output.



The cyclic converter offers continuous operation, automatic generation of the digital output in Gray-code form, and a building block structure. This structure uses a separate but identical circuit for each resolution bit. The cyclic converter finds use primarily in control and process applications.

**AN-558 CRT Display with Dynamic MOS RAM Storage**

Dynamic MOS RAMs are well suited to provide local storage in CRT display systems. Of necessity, the information placed on a standard CRT display must continually be scanned, or refreshed. As the CRT system performs its repetitive scan, an associated dynamic RAM can be automatically refreshed. An alphanumeric readout CRT display system, with its necessary support circuitry, are described in this note.

**AN-559 Simple RAMP A/D Converter**

A simple single ramp A/D converter which incorporates a calibration cycle to insure an accuracy of 12 bits is discussed. The circuit uses standard ICs and requires only one precision part—the reference voltage used in the calibration. This converter is useful in a number of instrumentation and measurement applications.

**AN-560 Designing Tuned Lines for UHF TV Tuners**

Transmission line equations have been used to obtain graphs which show the relationships between line length, tuning capacitance ratio, characteristic resistance and capacitance magnitude in the 473 MHz to 887 MHz range. Graphs are also included for oscillator tuned line design—517 MHz to 931 MHz.

**AN-561 How to Use Photosensors and Light Sources**

Practical methods are given for the design of light-sensing circuits using both semiconductors and incandescent light sources. A discussion on measuring light sources is also included.

**AN-562 MOS Dynamic RAMS in Memory Systems**

This note discusses the design of several mini-computer mainframe systems which use the 1024-bit MCM1172L and MCM1173L, the first in Motorola's expanding line of MOS dynamic memories. The first system discussed is a 4k word by 16-bit memory that uses the MCM1173L. The second system has a power down battery backup modification which allows "conditional" non-volatility, or non-volatility for the life of the battery. The third memory system is much larger with a total storage of one megabyte. The main feature of this system is a combination of random and sequential access.

**AN-563 Hybrid Gain Modules for Use in CATV Trunk and Line Extender Amplifiers**

This report describes three hybrid gain modules intended for CATV trunk line and line extender amplifiers. These modules are designed to operate from a +24 Vdc power supply and cover the 40–300 MHz frequency range.

**AN-564 An ADF Frequency Synthesizer Utilizing Phase Locked-Loop Integrated Circuits**

This application note describes an IC phase locked-loop frequency synthesizer suitable for the local oscillator function in aircraft Automatic Direction Finder (ADF) equipment.

**AN-565 Using Shift Registers as Pulse Delay Networks**

This note discusses a high-speed clocked shift register using MECL 10,000 flip-flops and employed as a digital incremental delay. The register may be clocked with a frequency division counter to accomplish delay with increments as small as 7.5 ns. The circuit, as developed, may be used for timing basic computer decisions or as an adjustable digital delay line for pulses.

**AN-566 High Speed Binary Multiplication Using the MC10181**

With a MECL 4-bit arithmetic unit you can reduce both package count and interconnections in a ripple multiplier and achieve very fast multiply times.

**AN-567 MECL Positive and Negative Logic**

Eight positive or negative logic assignments may prove convenient to the MECL system designer. This note describes the equivalences between the two approaches and provides guides for converting between them.

**AN-568 A Fuse-Thyristor Coordination Primer**

This report treats the considerations required for the use of fuses in protecting thyristors against short circuit fault currents. Basics of the mating philosophy are discussed and practical examples of coordination are given. Symbols, terms and their definitions are included.

**AN-569 Transient Thermal Resistance—General Data and Its Use**

Data illustrating the thermal response of a number of semiconductor die and package combinations are given. Its use, employing the concepts of transient thermal resistance and superposition, permit the circuit designer to predict semiconductor junction temperature at any point in time during application of a complex power pulse train.



**AN-571 Isolation Techniques Using Optical Couplers**

The material presented gives the basic considerations needed for using optical couplers. Although limited in example to the MOC1000 coupler, the information applies to other optical couplers where gallium arsenide diodes and silicon detectors are used.

**AN-572 Initial Reliability Report for MECL 10,000 Integrated Logic Circuits**

This report presents the first results of a continuing MECL 10,000 reliability program. It is based on a relatively small number of accumulated device hours. However, the limited data point strongly toward a high level of reliability for the MECL 10,000 Series high speed logic family.

**AN-573 Engineering Report: A Comparison Between MECL 10,000 and Schottky TTL Minicomputer Designs**

Two identical high speed minicomputer designs were performed, one using MECL 10,000 devices, the other using Schottky TTL devices. An evaluation was then made of the relative advantages of each logic family in the design. System speed of the MECL 10,000 machine was improved by 100%, while cost was up by only 50% over the TTL-S design.

**AN-574 CMOS: A New Logic Type For Control Systems**

Designing circuits that operate properly in high noise environments such as those commonly found in an industrial plant is often the bane of the control systems designer. CMOS circuits offer high noise immunity, plus the additional benefits of operation over a broad range of power supply levels and very low power dissipation. This article compares CMOS to other logic types and then describes how to interface it to them.

**AN-575 Variable Speed Control System for Induction Motors**

This report describes a method of controlling the speed of standard induction motors above and below their rated speeds. A unique variable frequency drive system is used to maintain the rated output torque at speeds below the nameplate rating.

**AN-577 Design Techniques for an 80 Watt, 175 MHz Transmitter for 12.5 Volt Operation**

This report describes the design of a four stage power amplifier capable of providing 80 Watts continuous power output at 175 MHz when operating from a 12.5 Volt supply. Techniques for operating two devices in parallel for the output stage are

presented. Performance data, high load VSWR information, and thermal design considerations are also included.

**AN-578 UHF Microstrip Amplifiers Utilizing G-10 Epoxy-Glass Laminate**

This note discusses the use of G-10 epoxy-glass laminate as a microstrip substrate. Two UHF power amplifiers are designed and used to evaluate the overall performance of the laminate.

**AN-579 Testing MECL 10,000 Integrated Logic Circuits**

Circuit testing techniques become increasingly important as circuit speeds approach and exceed the 2 ns range. With MECL 10,000 and MECL III circuits it is possible to exploit their 50-Ohm output drive capability to obtain highly accurate test data. This application note describes techniques for testing MECL 10,000 circuits for laboratory evaluation, and discusses key parameters which should be measured during incoming inspection rapid testing.

**AN-580 Thermal Runaway in High Power Thyristors**

The temperature dependence of reverse biased junction current may cause thermal runaway if an adequate heat dissipator is not used. Dissipator thermal resistance can be found from the presented curves. The mathematical derivation of the design equations based upon semiconductor theory is given and its examples illustrate use of the curves.

**AN-581 An MSI 500-MHz Frequency Counter Using MECL and MTTL**

The design of a MSI 8-digit LED readout 500 MHz counter using MECL III, MECL 10,000 and TTL is discussed. Described are two prescalers using MECL, along with the designs for two input amplifiers. A unique time-base controller is also shown for providing a multiphase clock to the counter.

**AN-582 An Introduction to Using the MCBH7601 Crosspoint Switch**

This application note describes the operation and properties of Motorola's MCBH7601 Crosspoint Switch. In addition, methods for addressing individual crosspoints within the 16 switch (4x4) array are discussed. Finally, the formation of larger arrays by interconnections among multiple MCBH7601s, is described.

**AN-583 A MECL 10,000 Main Frame Memory System Employing Dynamic MOS RAMS**

This application note describes the construction



of a dynamic MOS random access memory system that employs MECL 10,000 for the memory control logic. Considered in detail are the memory organization, layout rules, interfacing, and generation of the needed control signals.

**AN-584 Programmable Counters Using the MC10136 and MC10137 MECL 10,000 Universal Counters**

This application note describes operation of two MECL 10,000 universal counters and their use in high speed programmable counters. Circuit diagrams and waveform traces are included.

**AN-585 VHF Power Amplifiers Using Paralleled Output Transistors**

This report provides schematic diagrams, test results and construction information for two 80 Watt amplifiers designed for 12.5 Volt operation. These amplifiers are suitable for use as power amplifier stages in new VHF, FM transmitter designs and as ADD-ON outboard amplifiers to boost the power of existing transmitters. Detailed design procedures for similar amplifiers are given in AN-577.

**AN-586 Measure Frequency and Propagation Delay with High Speed MECL Circuits**

This application note describes an ECL frequency counter useful to 160 MHz, along with a propagation delay measuring circuit capable of 100 picosecond resolution.

**AN-587 Analysis and Design of the Op Amp Current Source**

A voltage controlled current source utilizing an operational amplifier is discussed. Expressions for the transfer function and output impedances are developed using both the ideal and non-ideal op amp models. A section on analysis of the effects of op amp parameters and temperature variations on circuit performance is presented.

**AN-588 A 20 kHz, 1kW Line Operated Inverter**

This report describes a 1 kilowatt ultrasonic inverter for use in 208-volt, line-operated, computer main-frame power supply systems. This particular design has an output capability of 5 Volts at 200 Amperes.

**AN-589 Generate Custom Waveforms Digitally**

A method of generating custom waveforms using IC counters, a read-only memory, and a new monolithic D/A Converter is described. Performance of a prototype model is noted as well as possible applications.

**AN-590 Servo Motor Drive Amplifiers**

The design of transformerless, AC servo amplifiers using power darlington transistors and IC op amps are discussed. Two types of power amplifiers are illustrated, one using single +28 Volt power supply, the second using high voltage transistors in complementary configuration for operating directly off the line.

Four different op amp preamplifiers and 90 phase shifters are also described.

**AN-592 AC Noise Immunity of MECL 10,000 Integrated Circuits**

This application note discusses AC noise immunity as it relates to MECL systems. Test circuits for measuring AC noise immunity are shown, and results to be expected for typical MECL 10,000 circuits are presented.

**AN-593 Broadband Linear Power Amplifiers Using Push-Pull Transistors**

Two solid-state linear power amplifiers are discussed. One provides 160 Watts while operating from a 28 Volt supply and the other provides 80 Watts from a 12.5 Volt supply. Both utilize push-pull output configuration for low harmonic distortion and transmission-line type transformers for broadband coupling.

**AN-594 A Frequency Synthesizer for Aircraft Automatic Direction Finding Systems**

This report describes a phase locked loop frequency synthesizer suitable as the local oscillator in an ADF system. The synthesizer is designed for receivers using a 455 kHz IF system. Motorola application note AN-564 describes a similar system for receivers using a 10.7 MHz IF.

**AN-596 A Class D Citizen's Band Transmitter Using Low-Cost Plastic Transistors**

This note describes the design and construction of an economical class D Citizens Band transmitter. The transmitter features a novel high-level collector modulation method using two diodes. A double-pi output matching network is employed for good harmonic suppression.































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